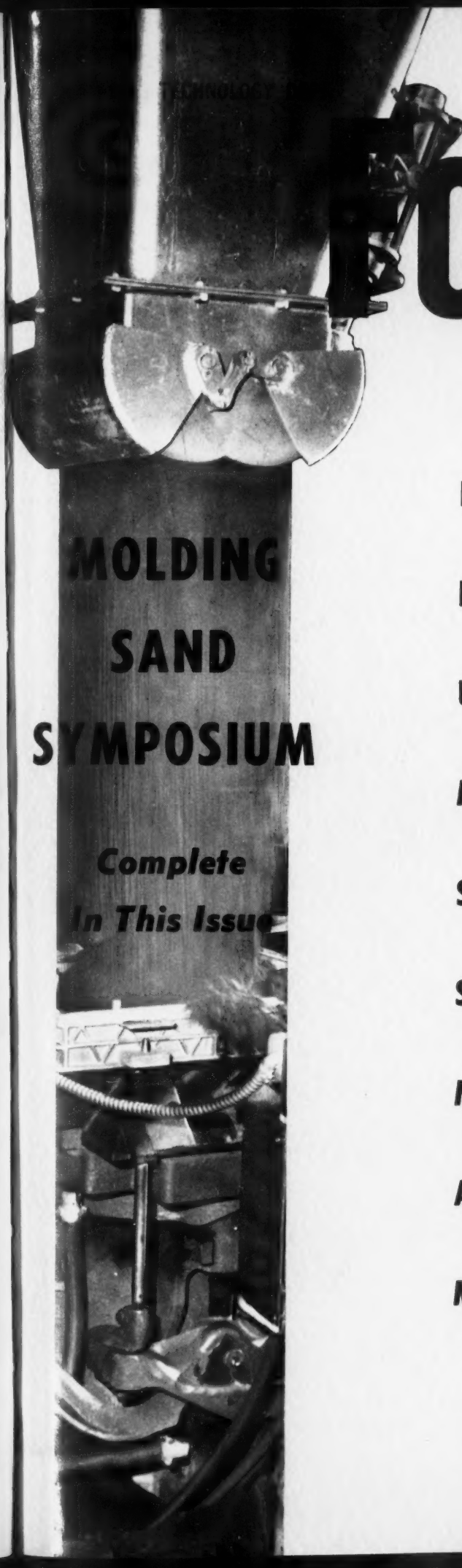

NOVEMBER 1954

FOUNDRY

WHEREVER METALS ARE CAST

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MOLDING SAND SYMPOSIUM

Complete In This Issue

Practical Molding Sand Control
By FRANK S. BREWSTER

Fundamentals of Synthetic Molding Sand
By NORMAN J. DUNBECK

Use of Naturally Bonded Molding Sand
By RICHARD H. OLMSTED and THOMAS H. HARDY

Molding Sand for the Gray Iron Foundry
By W. G. PARKER

Steel Foundry Molding Sand
By JOHN B. CAINE

Sand Practice in the Malleable Foundry
By L. E. EMERY

Molding Sand in the Brass Foundry
By WILLIAM B. GEORGE

Aluminum Foundry Molding Sand Use
By WALTER J. KLAYER

Magnesium Molding Sand
By K. J. HOPP

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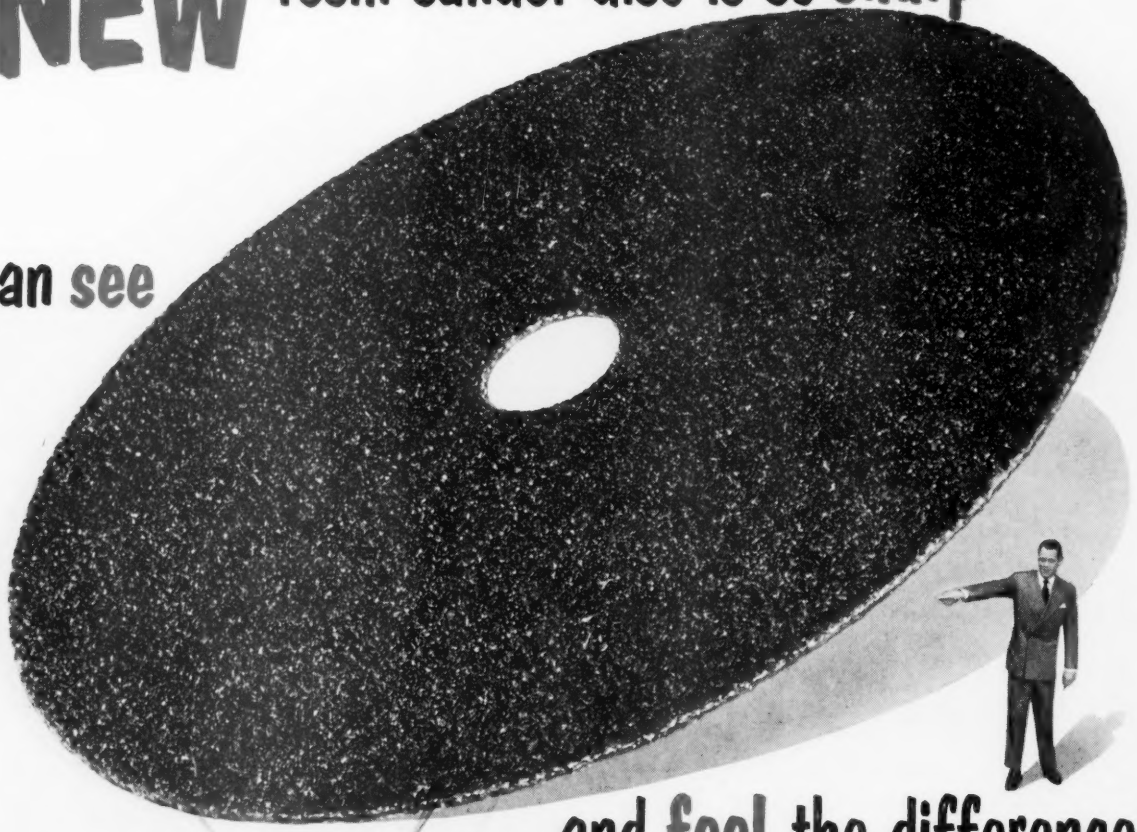
This NEW resin sander disc is so sharp you can see



and feel the difference!

You never saw a sander disc that *looks* so sharp... *feels* so sharp... *cuts* so fast, free and cool. It's the all-new Resin Sander Disc by CARBORUNDUM.

Test it on the toughest sanding job in your shop. See how it beats any other disc — for cutting ability, long life, uniformity. Notice how the edge holds its shape longer, and how the abrasive grain stands up under the most severe grinding conditions. And you'll find it *stays* uniformly sharp, from start to finish.

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FOUNDRY

November 1954

Volume 82—Number 11

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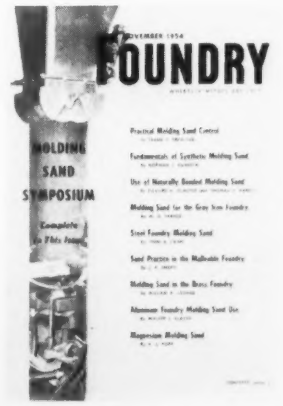

THE COVER: Ten experts on sand cover all phases of molding sand practice. The symposium is presented complete in this issue. It starts on page 102

Published monthly by the Penton Publishing Co., Penton Building, Cleveland 13, O. Subscriptions in the United States, possessions and Canada, one year, $5; two years, $8. Other foreign countries, one year $10. Single copies 75 cents. Copies published three or more months previous to date of current issue $1. Entered as second class matter at the postoffice, Cleveland, O., under the act of Mar. 3, 1879.
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WHERE ACCURACY COUNTS

49 inch shell has maximum diameter of 11 inches. 1500 pounds of metal is poured into each mold to obtain a finished casting weighing 600 lb. High precision cored cavity is shown at right.

Core assembly is shown in stages from front to rear. Stacked body cores are secured by steel rods. Barrel cores are inserted after first five body cores have been assembled.

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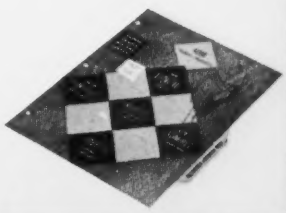
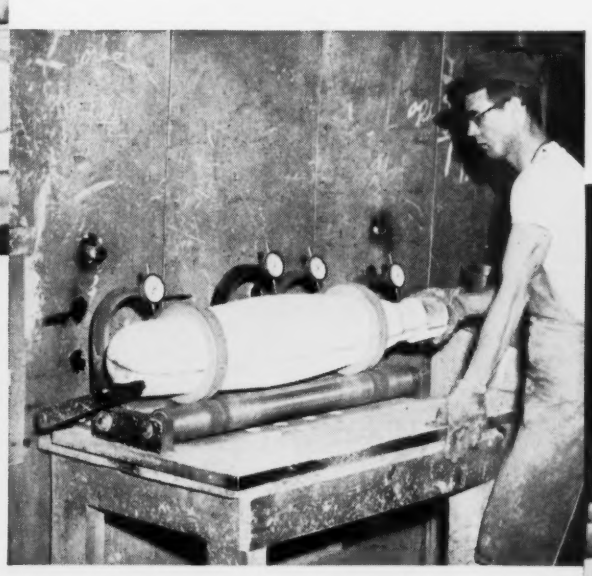
Continuous Technical Information Service on the latest developments from the ADM Sand Laboratory . . . furnished in handy file-folder form for quick reference. A request on your letterhead will put your name on our permanent Technical Information mailing list.





Barrel cores are made of halves pasted together . . . then tested for concentricity tolerance of ± .025.

Molds, when assembled are 84 inches high. Pouring requires catwalks and special clothing for safety.

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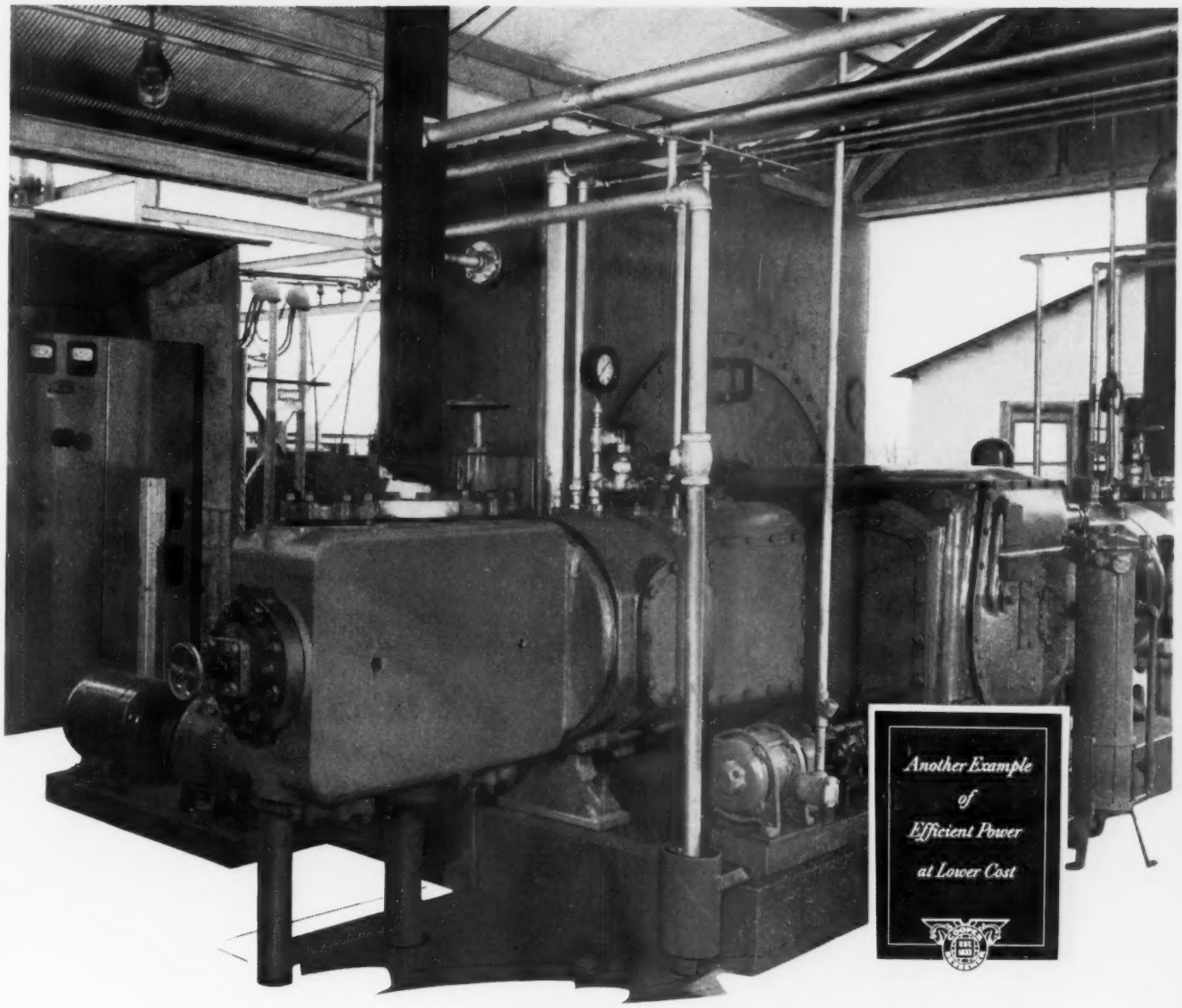

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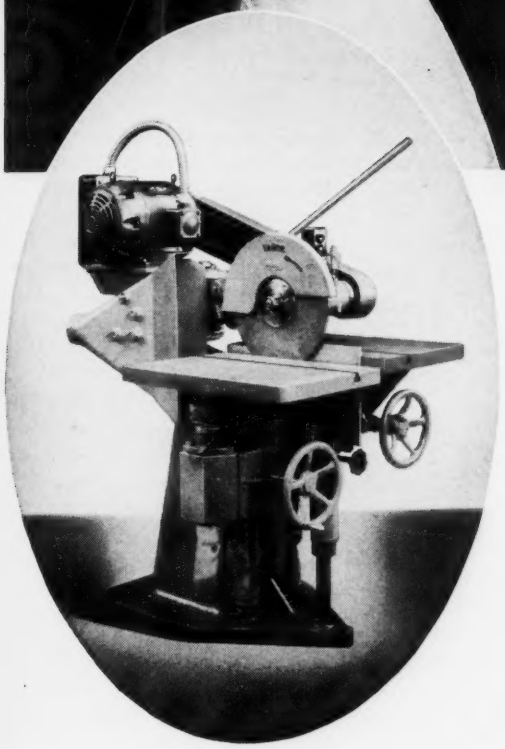

That's a mighty fast cut for a 16" wheel driven by a 10 H.P. motor—a good example of how top-speed production schedules are "meat" for Tabor-Brasive Cut-Off Machines.

These rugged machines cut gates and risers from non-ferrous and ferrous castings in a matter of seconds. Clean, close cuts, too, that slash snagging and finish-grinding costs to the bone—often do away with them entirely.

And for the *really tough* cutting jobs—in steel foundries—in copper cutting (either gates and risers or crucible feed stock)—wherever the going's the toughest, Tabor makes a big-value 15 H.P. cut-off.

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Motor	Table Size (Split Type)	Wheel Diam.	Max. Height of Work Under Wheel
10 H.P.	36" x 25"	16" Max. Thickness—5/32"	20" (with head over table) 46" (with head swung to side)
15 H.P. (Two Speed)	41" x 30"	20" Max. Thickness—3/16"	18" (with head over table) 44" (with head swung to side)
All motors fully enclosed, fan-cooled, ball bearing			

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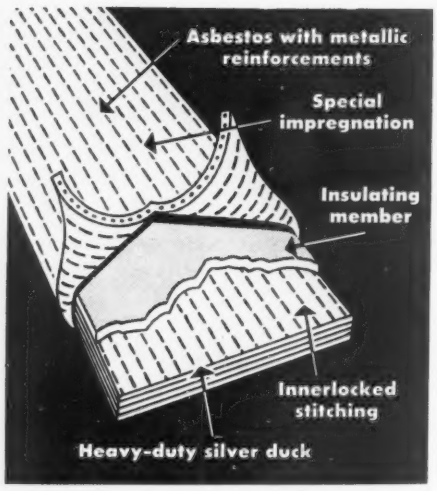
NEW armored belting resists abrasion and impact



WITHSTANDS HEAT, TOO!

Insulated SAHARA Belts have long been famous for maximum heat resistance and long wear. Almost every plant that has tested these belts now uses them exclusively for handling hot materials.

Now Imperial is manufacturing Sahara Insulated *Armored* Belting with wire reinforcements that gives extra value at no extra cost. The reinforcing wire is spun together with the asbestos fibers. Result: maximum resistance to abrasion and impact, as well as heat.

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(Also Super Insulated)

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WITH THE EDITORS

IT REALLY IS A GIRL: In his column "Lighter Side" in the Sept. 24 issue of the *Cleveland News*, Ralph Kelly had the following:

"Romance of Journalism—Moments after the new American Steel & Wire blast furnace, appropriately called Furnace A, was lit on the Cuyahoga River, Andy Staursky, industry publicist, handed out cigars to about twenty reporters, photographers and people who happened to be around—the cigars bore the strange device 'It's a Girl,' an untruth, since a blast furnace is a man."

As the ladies might tell you, Ralph, your slip is showing.

Traditon has it that the early blast furnaces were inclined to be obstreperous, cantankerous, and unpredictable. These were qualities which, it is reported, the masters also observed in their ladies. So it was quite natural for these men to refer to the furnaces with such feminine terms as "she" or "her." Later the bosses began to name the furnaces after their wives or daughters, and these names were used for many years. While numbers and letters are used in designating furnaces today, one still carries the beautiful name, Mary.

Sure it's a girl. Let's pass the cigars again.

—o—

Six Years Behind: We note the following in the *Milwaukee Journal*:

"The city board of purchases Thursday awarded a contract for sewer castings to the Schneider Fuel & Supply Co. on its low bid of $58,-833.75.

"This is the same firm to which the city owes some $900,000 for past work. The city has not been able to pay in full because the firm keeps six years behind in submitting bills."

—o—

Small Foundry Has Film: A recent program announcement of the Metropolitan Brass Founders' Association indicates that the Chemung Foundry Corp., Elmira, N. Y., has a film entitled "Operation of a Small Jobbing Foundry." Preparation of such a film surely shows enterprise.

—o—

Seventy-Five Years: The 25 Year Club of the Acheson Colloids Co., Port Huron, Mich., recently honored a father and daughter team representing 75 years of service with that company. Alfred E. Emms, former plant superintendent who retired in 1950, began working with the company 50 years ago, while his daughter, Mildred, a plant bookkeeper, just completed her 25th year with the firm. Guest speaker at the dinner honoring the 25-year people was Harold Higginbotham, director, Acheson Colloids Ltd., London, England.

—o—

A Visitor from England: During the month I had a most enjoyable visit with George E. Lunt, director and general works manager, Bradley & Foster Ltd., Darlaston Iron Works, Darlaston, South Staffs, England. Thanks so much for dropping in, Mr. Lunt, and be sure to include our office on your itinerary on your next visit.

—o—

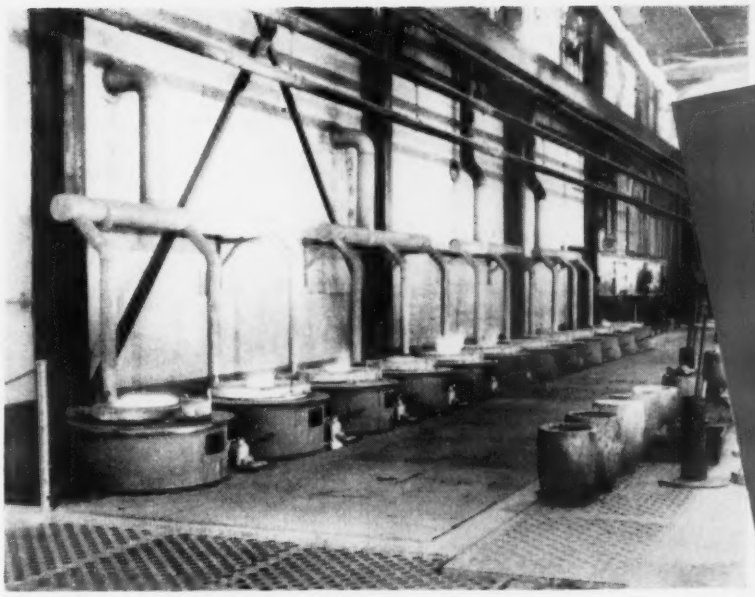
Finding the Market: *The El Reno American*, El Reno, Okla., on Aug. 12, carried an article on the El Reno Foundry, producer of high-quality gray iron castings. The first two paragraphs tell about the shop, the owner and the product as follows:

"Few people know it, but El Reno has one of the hottest, littlest industries in central Oklahoma. And if you're skeptical you might just pay a visit to the business concern of Charlie Barker, which is known as the El Reno Foundry and is located at 420 North Macomb. You'll see in short time that Charlie's firm is without a doubt one of the 'hottest' in town, and in more than one way.

"Delving chiefly into the casting of ornamental wrought iron, Charlie keeps a crew of eight busy supplying dealers throughout the Midwest with his 'dozen or so' attractive patterns. Barker said that there are wrought iron dealers in Oklahoma, Texas, Colorado, Missouri and several other states who place orders with him regularly. The dealers take the smaller pieces which are turned out here and fashion them together into larger pieces to fill specific orders which they get."

The El Reno Foundry also produces castings for a variety of consumers,

(*Concluded on page* 12)



A battery of gas fired, stationary Crucible furnaces at U. S. Naval Gun Factory, Washington, D. C. The pipes manifolded to each set of three furnaces supply air at one pound pressure. Proportional mixers assure constant gas-air ratio set for maximum fuel efficiency and proper furnace atmosphere.

Speed up melting with CRUCIBLE FURNACES

Metal Quality is best and costs are lowest when CRUCIBLE FURNACES are operated at maximum efficiency

BEST OPERATING CONDITIONS DEPEND ESSENTIALLY ON—

- ✔ 1. adequate fuel and air supply
- ✔ 2. proper fuel air ratio
- ✔ 3. furnace lining and covers in good condition

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Electro Refractories & Abrasives Corp.
Ross-Tacony Crucible Co.
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Have you seen the new " 'CRUCIBLE CHARLIE' says . . ." leaflets issued by Crucible Manufacturers Association? If not, ask your superintendent about this. He has a copy.

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for real tough
foundry service
you can't beat...
MATHEWS CONVEYERS

Mathews heavy-duty roller conveyers are designed for rugged foundry work. They are the result of nearly 50 years of experience in the handling of molds and castings — under all conditions — in every type of foundry. Call in your nearby representative. Have him show you how Mathews Conveyers might help you improve your materials handling.

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CANADIAN DIVISION . . . *Mathews Conveyer Company, Ltd.*
PORT HOPE, ONTARIO
Engineering Offices or Sales Agencies in Principal American and Canadian Cities

(*Concluded from page* 10)

including manufacturers of farm implements, rubber products, elevators and many others.

And the closing paragraph of the article should be of interest to many:

"It is the development of the foundry and the many markets for its products that are significant . . . existing proof that there are many unexploited possibilities in El Reno and other comparable cities. Cities which can ship their products throughout the nation are an answer to those who say that 'the small city is going downhill and doomed to become victims of the metropolitan centers.'"

—o—

Yes You Should: Just in case you have not seen the motto shown below, we are passing it along. Recently, it has been going the rounds in the form of buttons and cards.

BEFORE YOU LOUSE THINGS UP....

THIMK!

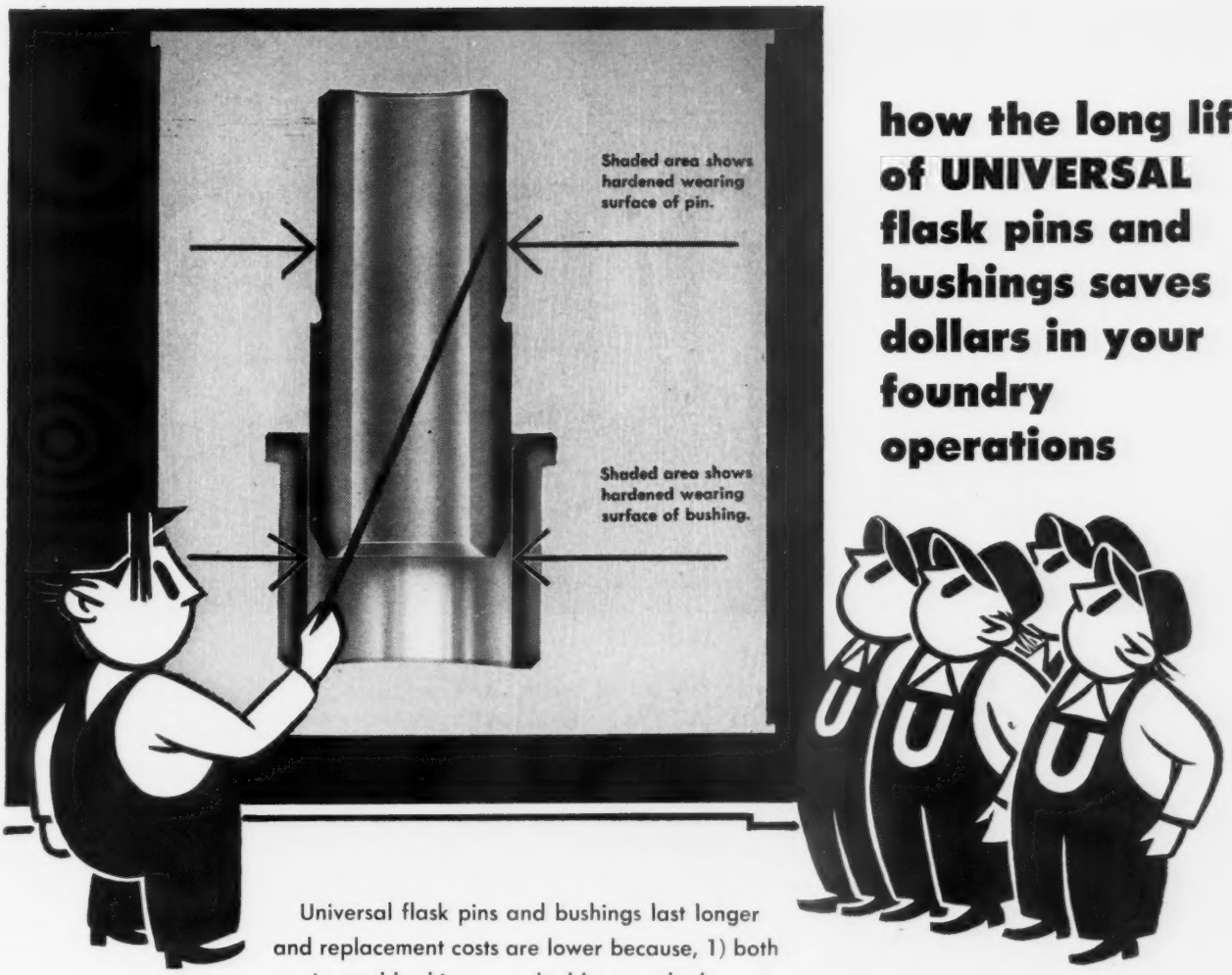
The card which we have reproduced was sent to Business Manager George Pope by Wm. H. Gerdts of William Zinsser & Co., shellac importers and manufacturers of Chicago and New York.

—o—

Stevens Contest Winners: Frederic B. Stevens Inc., Detroit, recently announced the winners of the "Give It a Quality Name" contest for its dustless seacoal which was held at the Cleveland AFS Foundry Show. First-prize winner was John R. D'Angio, finish foreman, Meadville Malleable Iron Co., Meadville, Pa., with the name Kleen-Air Dustless Seacoal. His prize was an RCA-Victor clock radio. Second prize, an Argus camera, was won by Earl L. Stevens, metallurgist, Galesburg Malleable Co., and the third prize, an Anoware serving set, was awarded to E. J. Lally, superintendent, Dostal Foundry & Machine Co., Pontiac, Mich.

—o—

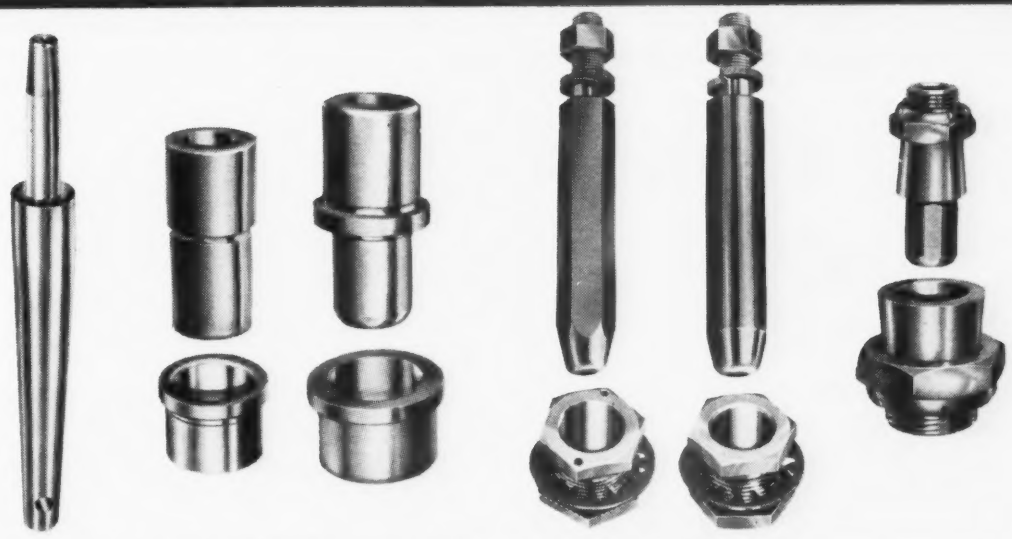
Well Worth While: The symposium on molding sand, which is featured in this issue (pages 102 to 139) was made possible through the splendid co-operation of the various authors and their organizations. The editors appreciate greatly these contributions to the literature of an important phase of foundry operation, and believe the readers will find them well worth while. F.G.S.



how the long life of UNIVERSAL flask pins and bushings saves dollars in your foundry operations

Universal flask pins and bushings last longer and replacement costs are lower because, 1) both pins and bushings are double quenched and double drawn to produce strong, ductile cores that can take rough treatment in the foundry without breaking or chipping and, 2) wearing surfaces are carburized and hardened to withstand wear. Universal flask pins and bushings are precision ground to insure instant, accurate alignment of cope and drag. For complete information, write to Universal Engineering Sales Co., 1060 Broad St., Newark 2, N.J.; 5035 Sixth Ave., Kenosha, Wis.; or the home office.

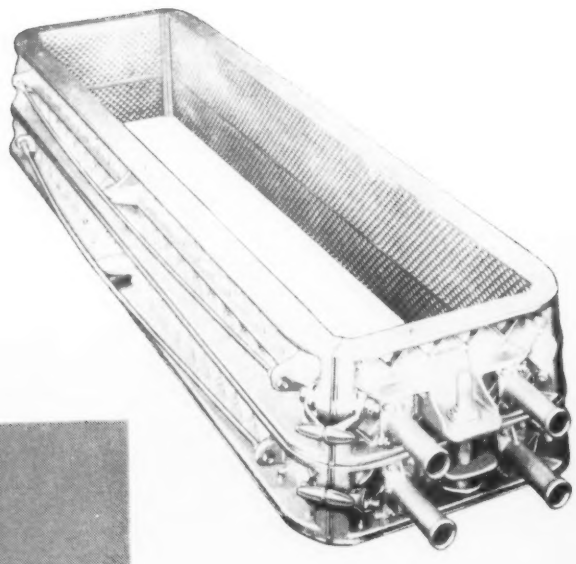
185



UNIVERSAL ENGINEERING COMPANY FRANKENMUTH 4, MICHIGAN

greater

HINES
POP-OFF
FLASK
MEMBER FEMA



THE

SAVINGS

There's no other flask equipment, in which you might invest your modernization dollars, that will pay greater dividends than will HINES "POP-OFF" FLASKS. For these efficient flasks will produce an unusually high percentage of perfect molds and, conversely, much less scrap. This outstanding advantage, plus extra-long service and trouble-free performance, is why . . . .

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Freer cutting action of CINCINNATI (PD) SNAGGING WHEELS

Saves you money!

Ever increasing numbers of foundries and weld shops are making the important discovery that you can get more pounds of metal per hour with the grains and bonds specified by CINCINNATI for snagging jobs. And whether you use swing frame, stand or portable grinders, CINCINNATI (PD) WHEELS give you outstanding economy not only through freer cutting action . . . but through self-dressing action *and Positive* Duplication.

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CINCINNATI (PD) WHEELS are made in vitrified and resinoid bonds for ferrous and non-ferrous foundries and weld shops. They are available in a complete variety of popular sizes and shapes. We'll be happy to tell you about our complete line of straight wheels, cups, cones and plugs, and to prove to you how CINCINNATI (PD) WHEELS will make money for you. Just contact us and we'll send one of our representatives. Wire, write or telephone Sales Manager, Cincinnati Milling Products Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.

FREE! **Send today for your copy of the new fact-packed, illustrated pamphlet on CINCINNATI (PD) Snagging Wheels.**

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Gentlemen:

I want to know more about CINCINNATI (PD) Snagging Wheels. Please send me a copy of "How To Reduce Snagging Costs and Increase Production."

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STREET ADDRESS_____

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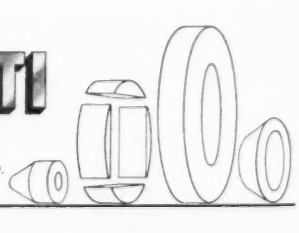
CINCINNATI
Grinding Wheels
THE CINCINNATI MILLING MACHINE CO.
Cincinnati 9, Ohio



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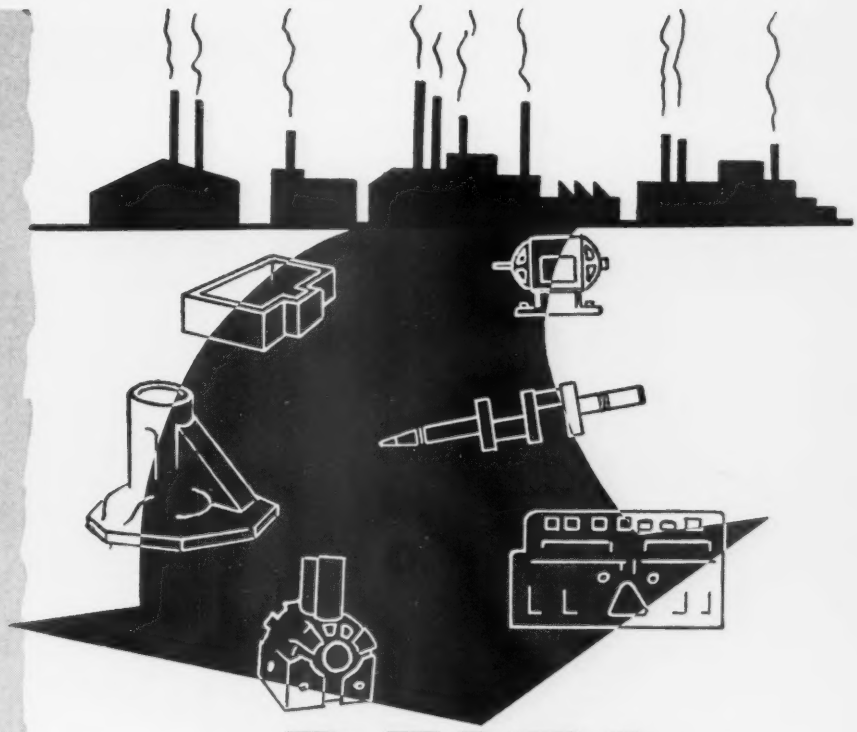
DELTA-DIETERT PROCESS BINDER 103XX
(For "D" process shell cores.)



DELTA
FOUNDRY PRODUCTS *SPEED* PRODUCTION OF BETTER, CLEANER CASTINGS AT *lower cost*

Every DELTA Foundry Product has been scientifically developed to provide more speed and greater economy in the production of finer-finished castings.

DELTA'S scientific control safeguards the higher quality and maintains the absolute uniformity of product so essential to consistently better results.

Get the Facts . . . Working samples and complete literature on Delta Foundry Products will be sent to you on request for test purposes in your own foundry.

DELTA OIL PRODUCTS CO.

MANUFACTURERS OF SCIENTIFICALLY CONTROLLED FOUNDRY PRODUCTS

MILWAUKEE 9, WISCONSIN

Fast-working 12 cu. ft. Auto-Scoop

Packs more "muscle," moves heavier loads

"Plants its front feet" to give positive traction, full bites

Now you can step up one-man bulk handling as much as 20% per load. The Load-Plus Auto-Scoop combines greater power (33 hp @ 1800 rpm) with heavy-duty construction and effortless hydraulic functioning . . . insures ample capacity for easy moving of 1200 lb. loads (up to 200 lbs. more than comparable scoop loaders).

Along with this extra capacity you get maximum stability and traction. Boom arms crowd the bucket forward as it rises. Pressure against the bucket applies *downward* pressure on the big driving wheels. The heavier the load being dug or carried, the more it increases traction.

Even stubborn materials yield quickly to Auto-Scoop action . . . without excessive traction crowding. Operator can retract his bucket, independently of hoisting, even at ground level. This low bucket tilt-back action enables him to work materials into bucket before hoisting boom arms, thus increasing traction right at the start.

Low tilt-back also facilitates loading small piles, windrows and loose parts, whereby operator can actually flip the load into the bucket, and permits carrying full bucket as low as 4½" above ground.

Specifically designed for most efficient scoop loader operation, the Auto-Scoop also offers shortest turning radius (6'6"), faster speeds (to 13.88 mph in reverse, 7.66 forward), higher clearance (4'6" under lip, 6'8" under hinge) and other time-saving features. Write for Catalog L12-4 and name of distributor who sells or services the Auto-Scoop in your city.

(Comparative performance based on well-known scoop loaders now in the field).

Power to load stubborn materials, such as super-phosphate. Pressure on rising bucket increases tractive capacity.

Easily handles full loads to 1200 lbs. at all dumping heights and positions. All operations of boom arms and bucket are under finger-tip hydraulic control.

For bigger work, Jaeger offers the 1 cu. yd. Load-Plus, with torque converter, power steering and either front-wheel or 4-wheel drive.

The Jaeger Machine Company, 502 Dublin Avenue, Columbus 16, Ohio

JAEGER LOAD-PLUS *auto-scoop*

AIR COMPRESSORS • PUMPS • MIXERS • PAVING MACHINES

Distributors throughout U.S. and Canada and Principal Cities of the World

any way you look at it . . .

SIMONDS

RESINOID BONDED
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save

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Tonnage ground! Wheel cost! Wheel life! From any cost-saving angle this wheel has it. Less wear on mount centers. Better balance, truer running for exceptionally fast stock removal. A Simonds exclusive for new efficiency on high speed snagging operations. Write for bulletin ESA-62.

Patented Red Strea flanges prevent chip ping of wheel side and edges at cente hole.

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PHILADELPHIA 37, PA.

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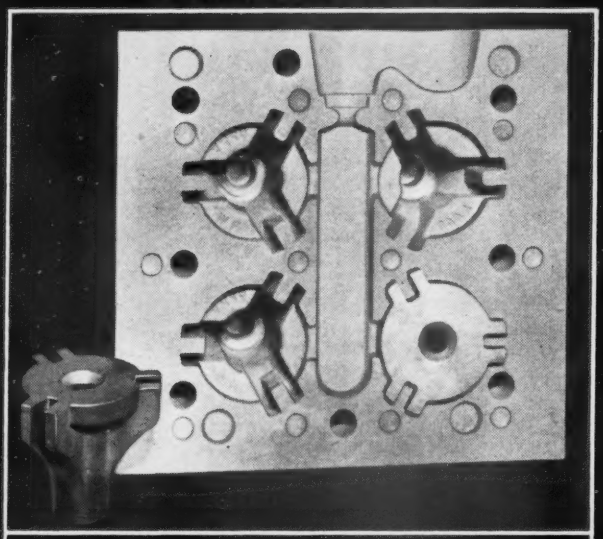
DIVISION OF SIMONDS SAW AND STEEL CO., FITCHBURG MASS. • OTHER SIMONDS COMPANIES. SIMONDS STEEL MILLS, LOCKPORT, N.Y., SIMONDS CANADA SAW CO., LTD., MONTREAL, QUEBEC AND SIMONDS CANADA ABRASIVE CO., LTD., ARVIDA, QUEBEC

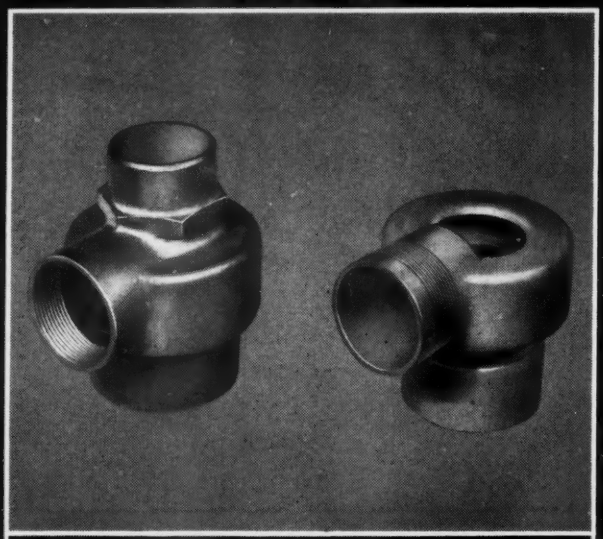
RESINOX

FOR SHELL MOLDS



Resinox gives this deep-draw shell mold the vertical strength required, yet precision castings come out clean, need little if any finishing.

FOR SHELL CORES



Shell cores, made with Monsanto resins, have cold strength to withstand rough handling yet shake out easily. Note fine reproduction of thread detail.

Cuts casting costs from the inside out

Report after report from some of the nation's major foundries prove that there are important differences in foundry resins, and that Monsanto resins save man-hours, cut finishing costs and practically eliminate the reject problem.

Resinox foundry resins produce shells and cores with good dimensional stability for close tolerance work, high hot strength, penetration resistance and collapsibility – all prime areas where resin quality is the key to cost control.

You can cut production costs and build quality into your castings from the inside out by using Resinox resins for shell molds and shell cores.

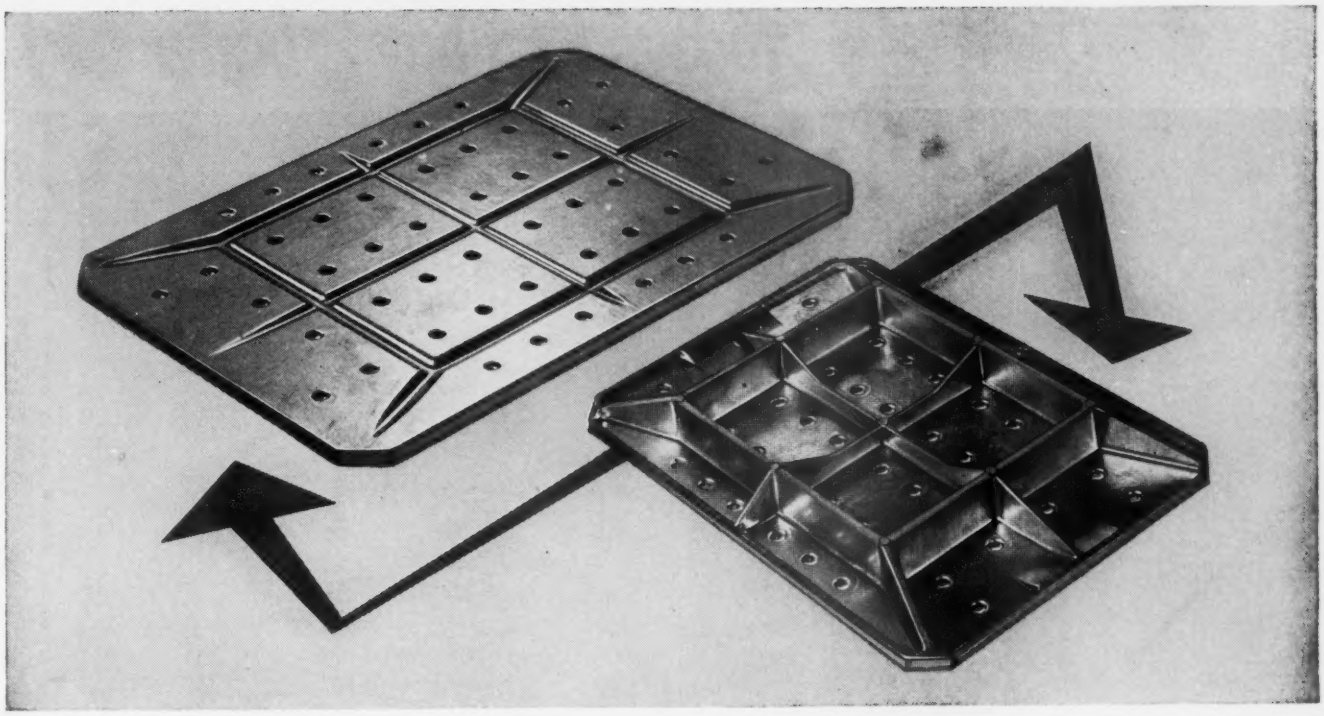
For full information on Monsanto's quality line of foundry resins for shell molding, core binding and sand conditioning, write today to MONSANTO CHEMICAL COMPANY, Plastics Division, Room 5710, Springfield 2, Mass.

Resinox: Reg. U. S. Pat. Off.

Meet more Monsanto products on CBS-TV "Morning Show"

MONSANTO

SERVING INDUSTRY . . . WHICH SERVES MANKIND



Look into both sides of the EDCO Dowmetal BOTTOM BOARD STORY...

—the design side...and the dollar side

Simple arithmetic is all you need to understand why the Edco Dowmetal Bottom Board story makes sense to a growing number of foundrymen. It's as simple as 1 plus 1 equals 2 . . . and 2 plus 2 equals 4.

Two main features, illustrated here, quickly tell the Edco design story . . . tell why Edco Bottom Boards produce better castings:

1. The flask side of an Edco Bottom Board is grooved and vented to permit escape of gases and to insure mold stability.

2. The opposite side is braced like a bridge, and the entire board is made of light-weight magnesium—gives you strength without weight for safe, easy handling and long board life.

That's the Edco design story.

Edco Dollar Story Makes Complete Sense, Too

When you switch to Edco Dowmetal Bottom Boards you'll find, like other foundries, that you have made a good move dollar-wise, too . . . for these reasons:

1. They pay for themselves. One foundry switched to Edco and cut its burning and breakage loss from 70% per year down to 3%. Another foundry kept a 5-year comparison record and found that under identical circumstances its wooden boards had a "casualty" record of 7500 boards lost, contrasted with a mere 12 for its Edco Dowmetal Boards. The same company found, further, that the scrap loss was 20% less with the Edco Boards.

2. You'll find that volume production of the most popular board sizes makes your original (and only) investment less than you'd normally expect.

That's the Edco dollar story.

It costs next to nothing to get the full dollars and cents story. A minute of time and a 3-cent stamp does it if you act now—but it might cost you a lot in savings lost if you put it off. Use the handy coupon.

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ALUMINUM ALLOY INGOTS

Without obligation, please send price schedule and list of 83 standard sizes available from stock.

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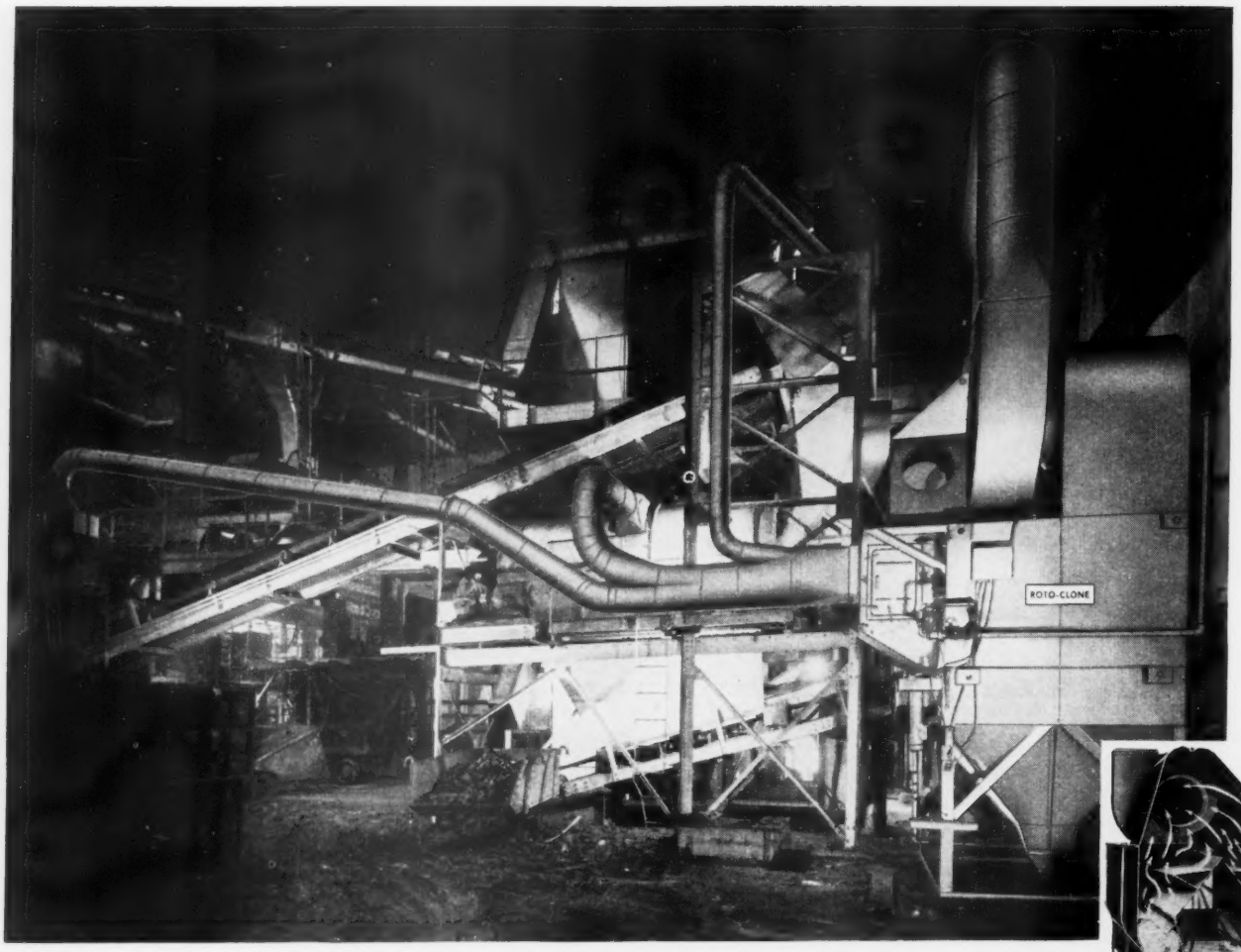
today's best buy is better air!



Type N Roto-Clone Arrangement D Sand Conditioning Installation.

Roto-Clone Type N Cut-away

A MAN-HOUR SUPPLY worth thinking about!

AAF Roto-Clones Improve Working Conditions By Eliminating Dust and Fumes.

Human efficiency and willingness to work are intangible factors that have a decidedly "tangible" effect on production schedules. Modern foundries find that improved working conditions, through the elimination of dust and noxious fumes by AAF Roto-Clones*, measurably increase efficiency as well as reduce absenteeism and labor turnover.

One-third of the foundry's dust occurs in sand conditioning systems like the one above. The Type N Roto-Clone shown is a hydro-static precipitator of high efficiency which removes dust by dual washing and scrubbing action and combines in one unit all three functions of exhausting, separating, and storing dust . . . in the form of sludge.

The complete line of AAF Roto-Clones offers a wide selection of performance and operating characteristics that will efficiently control every dust source. For the correct solution to your dust or air pollution problems call your nearby AAF representative or write direct to American Air Filter Company.

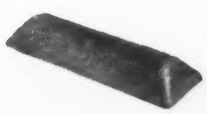
**ROTO-CLONE is the trade-mark (Reg. U. S. Pat. Off.) of the American Air Filter Company, Inc., for various dust collectors of the dynamic precipitator and hydro-static precipitator types.*

AAF **American Air Filter**
COMPANY, INC.

266 Central Avenue, Louisville 8, Ky. • American Air Filter of Canada, Ltd., Montreal, P. Q.

Quality Castings Begin with Quality Pig Iron

THE quality of your gray iron castings depends on pig iron produced under controlled conditions. That's why we take special care in the production of Neville Pig Iron, day in and day out, year in and year out. Modern controls like those above, for example, enable us to maintain furnace temperatures and pressures within a cat's whisker of perfection. When you specify Neville Pig Iron, you're sure of uniform, close grain and the precise analysis you need. ● Why not let Neville Quality work on *your* side, just as dozens of well-known foundries do. We'll be glad to discuss your specific problems and requirements.



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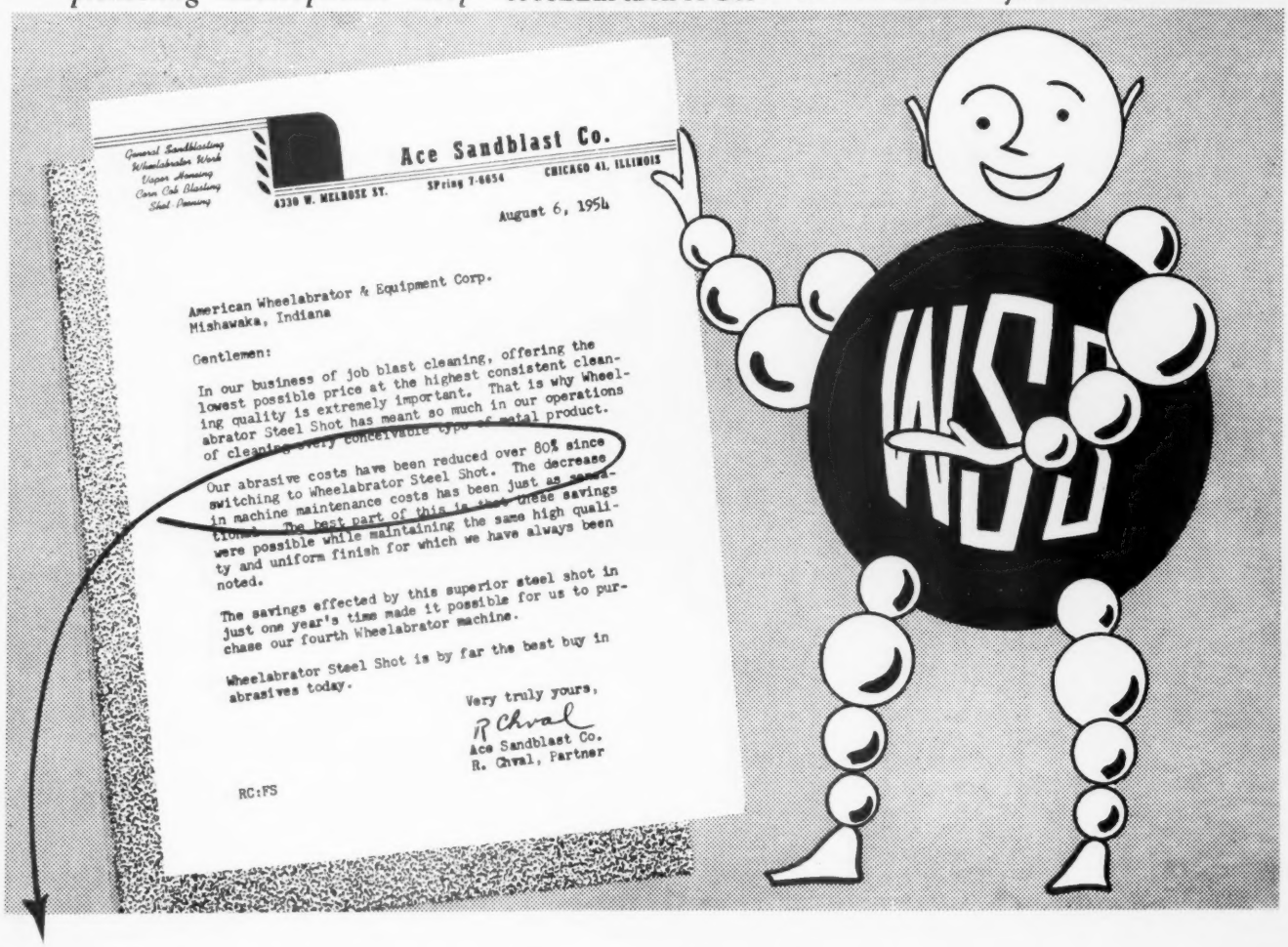
pioneering developments keep **WHEELABRATOR®** *STEEL SHOT first in abrasives*


Ace Sandblast Co.
4330 W. MELROSE ST.
SPring 7-6654
CHICAGO 41, ILLINOIS
August 6, 1954
American Wheelabrator & Equipment Corp.
Mishawaka, Indiana
Gentlemen:
In our business of job blast cleaning, offering the lowest possible price at the highest consistent cleaning quality is extremely important. That is why Wheelabrator Steel Shot has meant so much in our operations
Our abrasive costs have been reduced over 80% since switching to Wheelabrator Steel Shot. The decrease in machine maintenance costs has been just as sensational. The best part of this is that these savings were possible while maintaining the same high quality and uniform finish for which we have always been noted.
The savings effected by this superior steel shot in just one year's time made it possible for us to purchase our fourth Wheelabrator machine.
Wheelabrator Steel Shot is by far the best buy in abrasives today.
Very truly yours,
R. Chval
Ace Sandblast Co.
R. Chval, Partner
RC:FS

"Our Abrasive Costs Have Been Reduced Over 80%"

Ace Sandblast Co. Gets Highest Quality Cleaning at Lowest Price with Wheelabrator® Steel Shot

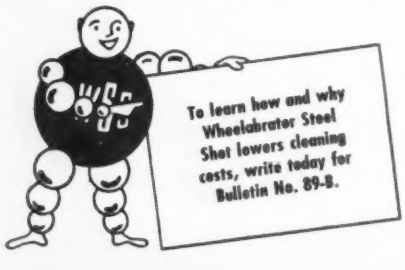
In the highly competitive jobbing blast cleaning business, customer acceptance of uniform surface cleanliness at just the right price makes the difference between success and failure. That's why Ace Sandblast Co., one of the largest and best equipped job cleaning shops in Chicago, sings such high praises for Wheelabrator Steel Shot.

Their prices are right and finish quality is uniformly perfect with their unbeatable combination of Wheelabrator airless blast equipment and Wheelabrator Steel Shot. Each of their four Wheelabrators is operating with this superior electric furnace steel shot.

Since switching to Wheelabrator Steel Shot, abrasive costs have been slashed 80%, the decrease in machine maintenance costs has been equally sensational. These savings enabled them to purchase an additional Wheelabrator making it possible for them to widen the scope of their cleaning activities.

This is the kind of report we're getting every day from users. It's not surprising. Wheelabrator Steel Shot is a proved money maker for every blast cleaning operation.

If you want to reduce your cleaning costs you ought to know more about Wheelabrator Steel Shot. Let us make a survey of your blast cleaning operations (no obligation, of course) — there's a Wheelabrator engineer nearby who is prepared to study your problem and recommend the SAE size Wheelabrator Steel Shot for your needs. Write today for details.



American
WHEELABRATOR & EQUIPMENT CORP.

Wheelabrator STEEL SHOT

505 S. Byrkit St., Mishawaka, Ind.

Miller AIR CYLINDERS

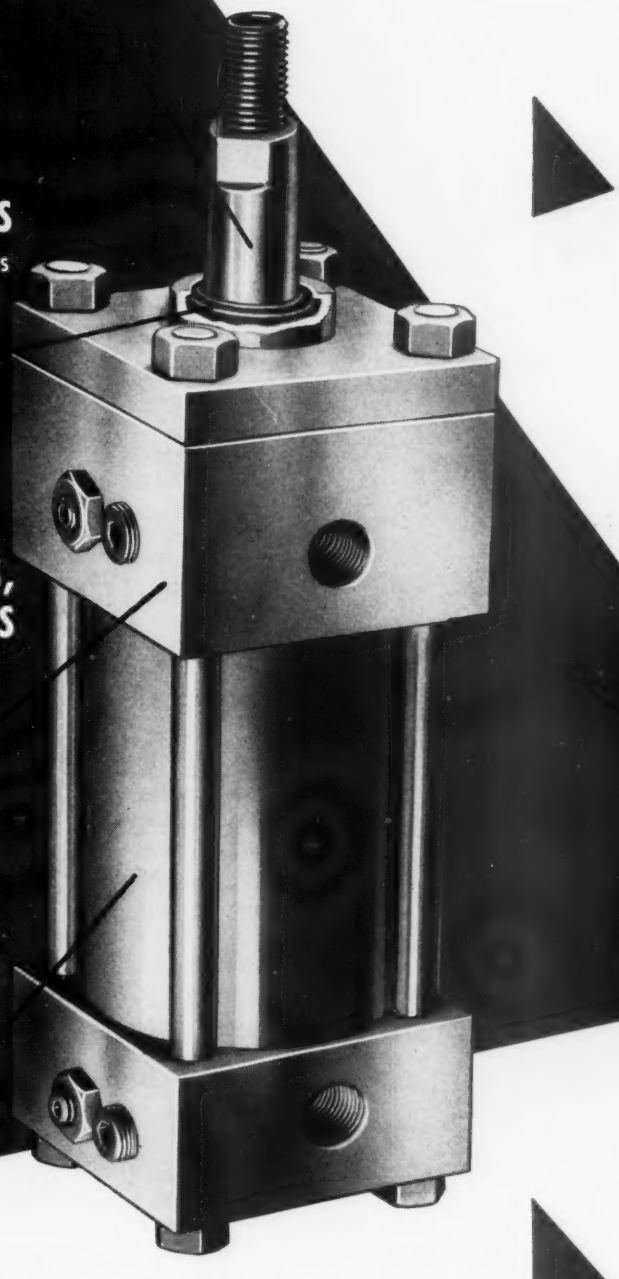
Ideal For Toughest Foundry Service

HARD CHROME PLATED PISTON RODS
Prevent Scratch-Damage, Nicks and Rust

DIRT WIPER SEALS
Protect Rods, Seals, Bushings

SOLID STEEL HEADS, CAPS and MOUNTINGS
Eliminate Breakage

BRASS BARRELS
Eliminate Rust and Corrosion



Miller Standard Air Cylinders are soundly designed and sturdily construct that, even under the severe abrasi conditions of foundry service, they pr vide extremely long life without requ ing packing replacement or other mai tenance.

They are offered in a complete line "custom-built" units available on norm scheduled delivery in *thousands* of co binations of bore, stroke and mountir to meet every foundry need.

They feature the SPACE-SAVIN SQUARE DESIGN originated by Mill in 1945 and fully met the J. I. C. Pne matic Standards years before their ado tion in 1950.

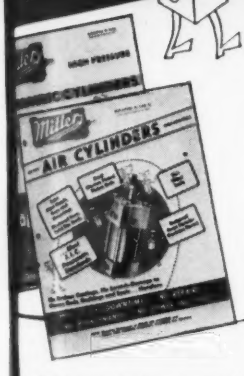
Immediate Delivery From "Stock

Rapidly expanding list of Miller "Stock" Cylinde for *immediate, off-the-shelf delivery* now include *thousands* of different combinations of bor stroke and model and covers both air an hydraulic cylinders—cushioned and non-cushione

These are in addition to Miller "Custom-Built Cylinders available on normal scheduled deliver in an almost infinite selection.

"Stock" Boosters also available for immediat delivery.

Write for Complete Catalog and Stock List!



WRITE FOR CYLINDER BULLETINS A-105 and H-104

Complete Miller cylinder line includes: air cylinders, 1½" to 20" bores, 200 PSI operation; low pressure hydraulic cylinders, 1½" to 6" bores for 500 PSI operation, 8" to 14" bores for 250 PSI; high pressure hydraulic cylinders, 1½" to 12" bores, 2000-3000 PSI operation. All mounting styles available.

MILLER FLUID POWER CO.
(Formerly **MILLER MOTOR COMPANY***)*

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CLEVELAND • YOUNGSTOWN • DAYTON • PITTSBURGH • PHILADELPHIA • BOSTON • HARTFORD • NEW YORK CITY • BUFFALO • ST. PAUL • GRAND RAPIDS • DETROIT • FLINT • FORT WAYNE • SOUTH BEND • INDIANAPOLIS • MILWAUKEE • LOUISVILLE • KANSAS CITY • SEATTLE • LOS ANGELES • SAN FRANCISCO • BALTIMORE • DENVER • ST. LOUIS • MOLINE • CHICAGO • HOUSTON • TORONTO, CANADA and OTHER AREAS

AIR & HYDRAULIC CYLINDERS • BOOSTERS • ACCUMULATO
COUNTERBALANCE CYLINDERS

NEW COST-SAVING PROCESS FOR FOUNDRIES

The Airco Carbide Injection Process in use at the American Brake Shoe Company, Mahwah, N. J.

Carbide injection method developed by AIRCO® cuts ductile iron alloy costs up to 50 percent

permits melting in acid cupolas

Many foundries that have limited their production to gray iron will soon enter the ductile iron field, thanks to a new Airco development. Desulfurization of molten iron by injecting calcium carbide can reduce sulfur content to such levels that ductile iron can be melted in ordinary acid cupolas. At the same time, this sulfur content — as low as 0.01 percent — makes it possible to cut the amount of expensive alloy elements drastically with no sacrifice of mechanical properties. Foundries already using Airco carbide injection report savings of up to 50 percent on these alloy costs alone!

The injection equipment itself is simple and inexpensive. It consists of a hopper and an injection tube through which the powdered carbide is injected into the molten iron by a stream of nitrogen. The operating expenses are the cost of the gas and the carbide, trivial in comparison to the savings they make possible.

Calcium carbide injection is a fruitful result of Airco Technical Service's constant effort to find new profitable techniques for customers. If you have a welding, cutting or metallurgical problem, why not let Airco help you develop the most practical approach to it? It can pay big dividends.

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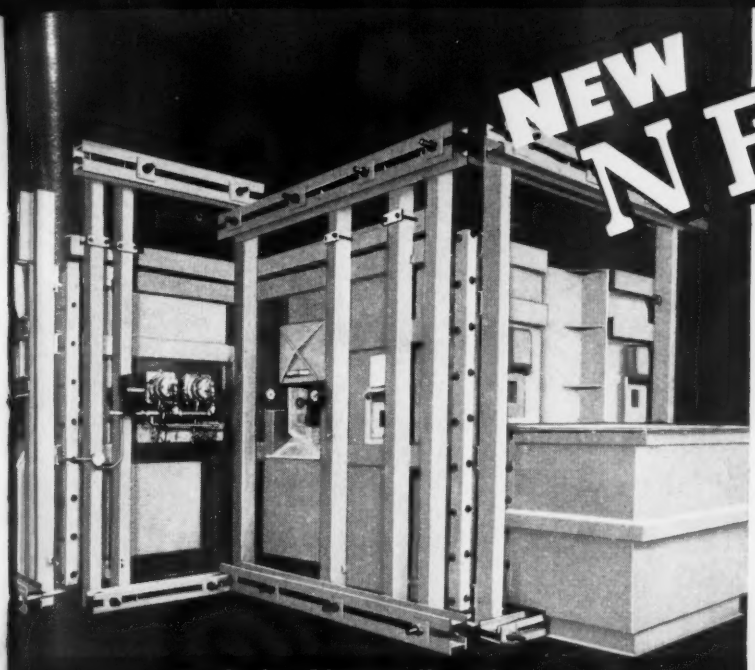
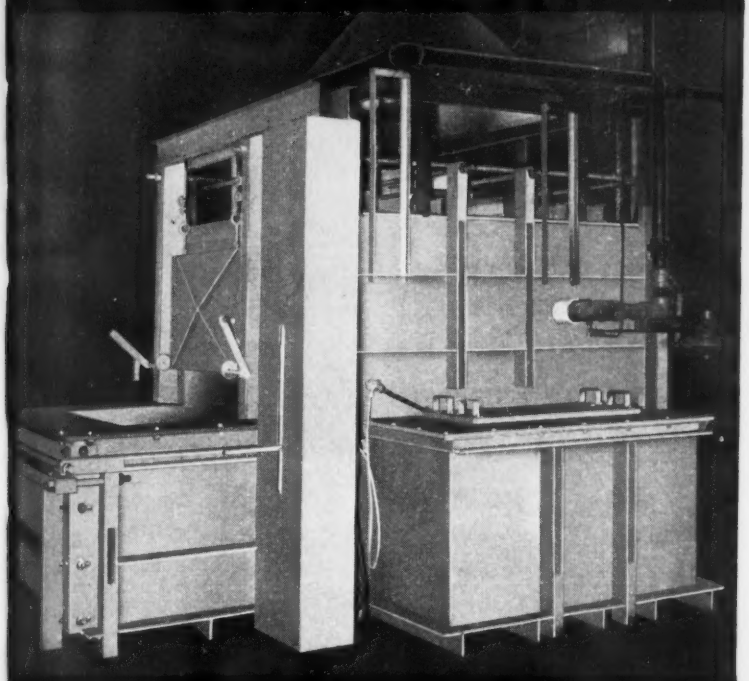
Airco Company International

Foreign Subsidiaries: Air Reduction Canada Limited, Cuban Air Products Corporation



Made for 120,000 lbs. Zinc



Made for 16,000 lbs. Zinc

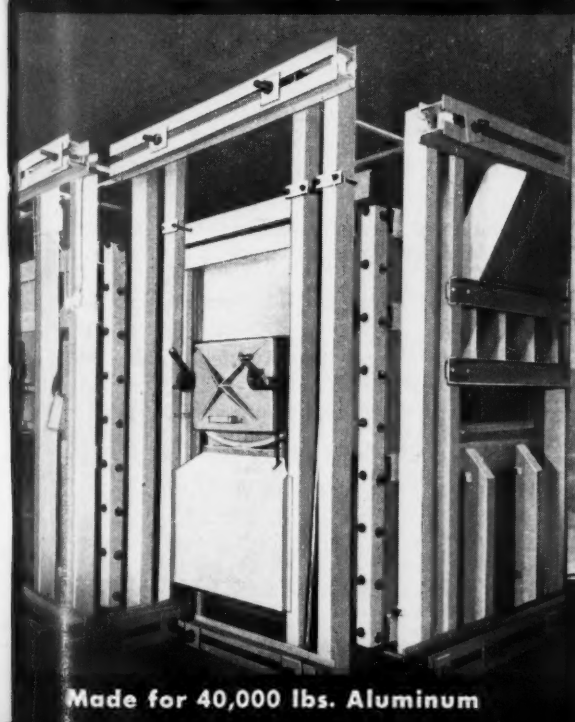
NEW NEW NEW!

STROMAN NOW OFFERS A COMPLETE LINE OF REVERBERATORY FURNACES FOR THE MELTING OF . . .

ALUMINUM, ZINC, BRASS

Capacities are unlimited

These reverbs are built to assure heavy duty production for Smelting, Extrusion work, Die Casting, Permanent Molding and Foundry melting. Now in operation in some of the most prominent plants in the country they have proved their ability to deliver great volumes of metal that results in perfect castings, every time. They are easy to work with and around . . . operate most economically and are easy to maintain. Their efficiency and economy will amaze you and convince you of their superiority to any other furnace available. Why not write to-day for full information.



Made for 40,000 lbs. Aluminum

Made for 25,000 lbs. Aluminum

STROMAN FURNACE & ENGINEERING CO.
DIVISION OF
THE PETERSEN OVEN CO., FRANKLIN PARK, ILL.

New lightweight grinder is a HEAVYWEIGHT WORKER!

Why weigh down an operator with a heavier grinder? Put a new 7 pound air-powered CP Vertical Grinder in his hands and he'll remove the same amount of metal as he formerly did with a 10 pound tool!

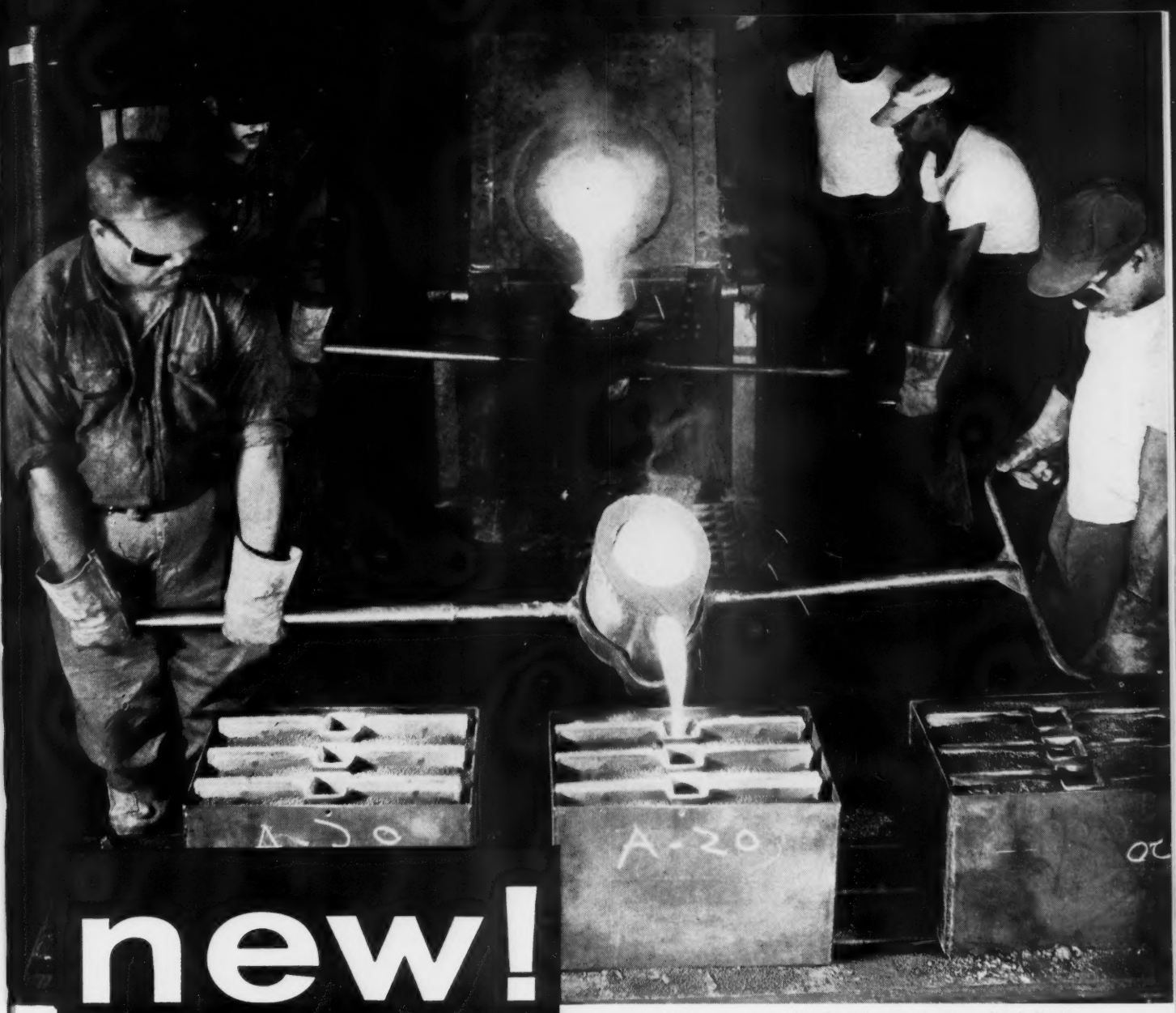
Designed for driving cup wire brushes and grinding wheels, sanding discs, and cut-off wheels, the CP-3190 is tops for its handling ease and versatility. The features below explain why the CP-3190 takes the constant beating of heavy industrial usage with minimum maintenance:

- **Splined type floating rotor to prevent end-plate wear from wheel thrust.**
- **Continuous lubrication is afforded by large oil reservoir and built-in lubricator.**
- **Safety governor valve cuts off air supply in the event of possible governor failure.**

Available in speeds up to 8000 RPM and in capacities capable of handling 6" cup wheels, and 7" and 9" disc sanding pads and cut-off wheels. For more information write *Chicago Pneumatic Tool Company, 8 East 44th Street, New York 17, N. Y.*

Chicago Pneumatic

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES • ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES



new!

THOR MCF-7 Shell Mold Resin

Photo courtesy Alloy Steel Products, Bloomfield, N. J.

This new "neat" resin (100% resin content—no filler) improves your shell-mold process 6 ways:

1. Tolerates wide time and temperature ranges. Does not over-cure easily. Eliminates critical time and temperature control.
2. Provides full-thickness build-up . . . even on angular and vertical pattern surfaces.
3. No "peel-back" during investment.
4. No "drop-off" during investment.
5. Strips clean and easy off the pattern. Leaves no "crumbs".
6. Produces a flat, rigid shell off the pattern. No warping.

MCF-7 has been field-tested on all types of mechanized equipment and on all types of metals. It's in use now on production castings. It's ready for trial runs on *your* shell molds. When can we demonstrate it for you? Address: The Borden Company, Chemical Division, Dept. F-104, 350 Madison Avenue, New York 17, N. Y.

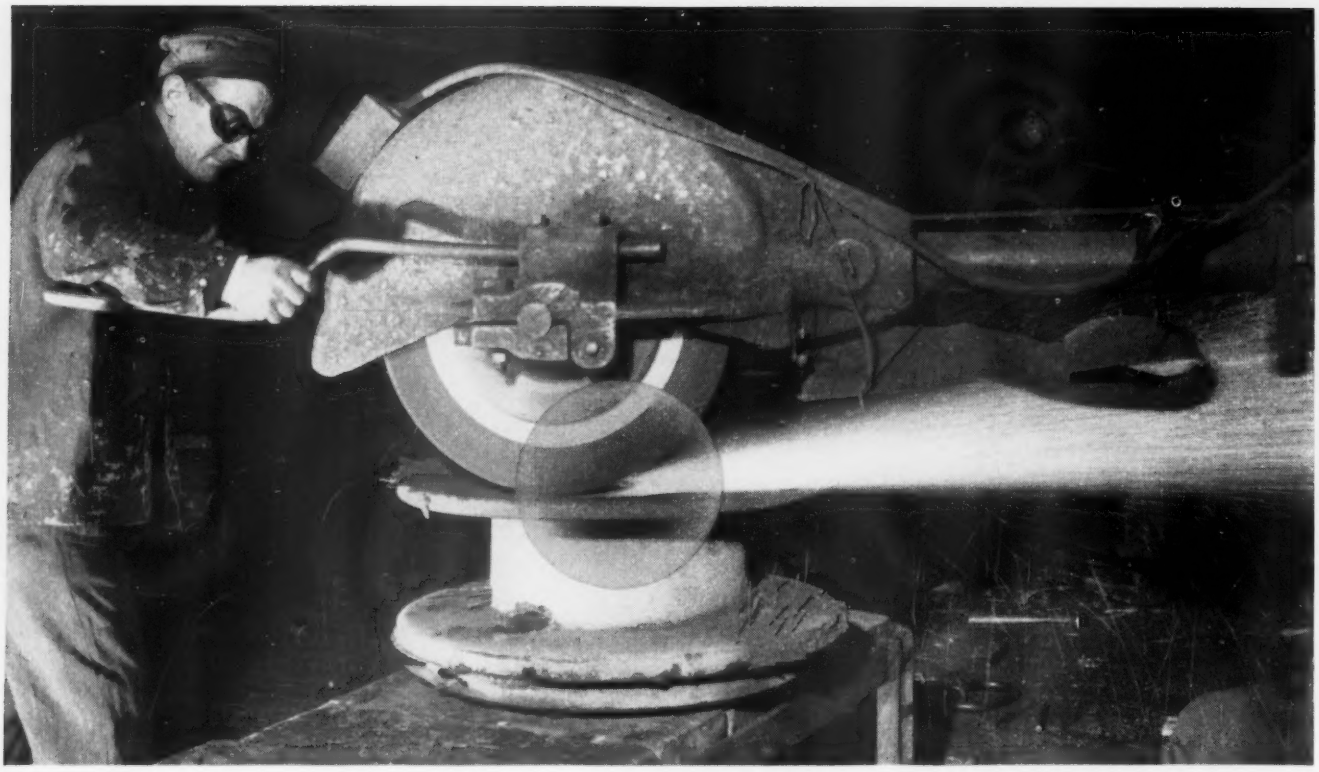
PS: For hot-bonding of shells, try THOR MCF-3378-4 shell-bonding resin.

FOUNDRY RESINS

THE *Borden* COMPANY

CHEMICAL DIVISION

Urea and Phenolic Resin Core Binders . . . Shell-Mold Resins . . . Core Spray . . . Core Paste . . . Parting Agents



Fast cutting action plus extra long life is the "Touch of Gold" combination that makes Norton ALUNDUM resinoid wheels unbeatable for rough grinding steel.

How to grind steel castings more profitably...

Norton ALUNDUM* wheels are engineered to bring you the time-and-money-saving, value-adding

"TOUCH of GOLD"

Here's one good way to find out how Norton wheels can improve your cleaning room operations.

Ask your shopmen.

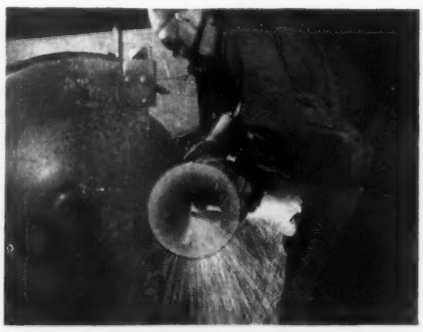
On steel castings, for example, they'll tell you that Norton ALUNDUM wheels handle easier (they hug the work), remove stock faster and last longer.

Another good way is to compare your cleaning room costs — testing Norton wheels against any others. You'll find that the expertly engineered "Touch of Gold" performance of Norton wheels saves you money on every rough grinding job — from lightest portable to heaviest swing frame work.

See your Norton distributor

for the Norton wheels that are exactly right for your jobs. Get the answers to such variables as: shape, type and analysis of the casting, type of grinding machine, area of wheel contact, amount of pressure applied, etc. Ask him for the fully illustrated booklet: *Rough Grinding*. Or write to NORTON COMPANY, Worcester 6, Mass. Distributors in all principal cities, listed under "Grinding Wheels" in your classified phone directory. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Massachusetts.

W-1598



Get twice the efficiency from your floor or bench grinders by using Norton wheels on both ends of your machines.

Rough grinding steel castings with portable machines is faster, easier, more economical — thanks to Norton ALUNDUM abrasive and Norton-developed resinoid bonds.

Making better products... to make your products better

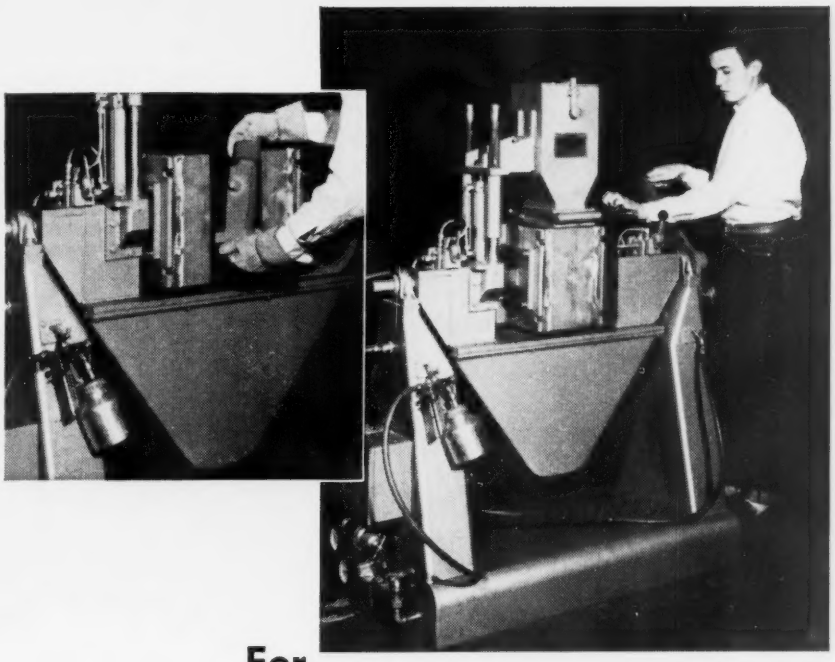
NORTON

and its BEHR-MANNING division

NORTON: Abrasives • Grinding Wheels • Grinding Machines • Refractories
BEHR-MANNING: Coated Abrasives • Sharpening Stones • Pressure Sensitive Tapes

*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries

(Advertisement)



For low cost, accurate, shell molding, specify...

Rugged and compact, the MC-4 core machine designed by Shalco Engineering Corp., Palo Alto, California, produces a finished core by the shell process every 30 to 50 seconds. Built-in heaters complete the curing in the corebox, eliminating core driers, ovens and handling; cores are delivered fully cured and ready for setting. Requiring power of only 5 KW, 200V and an air pressure of 100 psi., the MC-4 has a capacity of up to 12"x9"x6".

DOW CORNING 8 EMULSION

Assures Fast, Positive Release • Keeps Patterns Clean Nonflammable and Noncorrosive • Dilutible in Hard or Soft Water • Resists Creaming or Separating

Especially designed for the shell process, Dow Corning 8 Emulsion, a silicone parting agent, can't break down to form a carbonaceous deposit on patterns. Cleaning costs are minimized and you increase production of shells with consistently high dimensional accuracy. For more information and a free trial sample, return the coupon today.

DOW CORNING CORPORATION
MIDLAND MICHIGAN

first in silicones

DOW CORNING SILICONES

ATLANTA CHICAGO CLEVELAND DALLAS DETROIT LOS ANGELES NEW YORK WASHINGTON, D.C. (SILVER SPRING, MD.)
CANADA: DOW CORNING SILICONES LTD., TORONTO ENGLAND: MIDLAND SILICONES LTD., LONDON FRANCE: ST. GOBAIN, PARIS

DOW CORNING SILICONES **in the Foundry**

FIGHTING CORROSION caused by soda ash? Try a silicone based paint. A southern foundry found soda ash was corroding the frames of fan motors operating in exhaust stacks. A year ago the frames were coated with a silicone based paint. No visible signs of corrosion have appeared since; the silicone paint is still in excellent condition.

ROLLER BEARING LUBRICATION was a major headache to one eastern foundry. The bearings, located on a sintering conveyor, required daily lubrication with a bentonite base grease to maintain operation at oven temperatures in the range of 350 F. After changing to Dow Corning 44 silicone grease, foundry maintenance men cut the relubrication schedule to once every eight weeks.

OVERLOADS AND HIGH TEMPERATURES are death to organic insulated motors. Take, for example, the 5 hp Class A drive motor on a hot ingot conveyor in another eastern foundry. Operating on a 20 second start and stop cycle, the motor hardly gets up to speed before it is shut down. This, plus extremely high ambient temperatures caused the motor to burn out about every six weeks.

Four years ago the motor was rewound with Class H insulation made with Dow Corning silicones. The Class H job cost about twice as much as a Class A rewind but the silicone insulated motor hasn't failed yet. That's more than 30 times the life. Imagine the savings in rewind costs!

For more information about any of these Dow Corning silicone products,

Send this coupon TODAY

DOW CORNING SILICONES

DOW CORNING CORP.
Dept. AH-23
Midland, Michigan

Gentlemen: Please send me
- ☐ Free sample of Dow Corning 8 Emulsion
- ☐ Silicone-based Protective Coatings
- ☐ Description of Silicone Greases
- ☐ Performance data on Class H Insulation

Name_____

Company_____

Address_____

What you can expect from "SW" Cupola Collector operation!

TESTS ON "SW" CUPOLA COLLECTOR OPERATION*

CUPOLA OPERATING DATA

Cupola Size	#8 Whiting
Shell Dia. at Melt Zone	78 inches
Shell Dia. at Top	78 inches
I. D. Lining—Melt Zone	53 inches
Average Daily Melt	7 hours—50 tons
Average Melt Rate	7.5 tons/hr.
Iron—Coke Ratio	7 to 1
Blast Air	3,200—4,750 CFM
Area of Charging Door	50 square feet

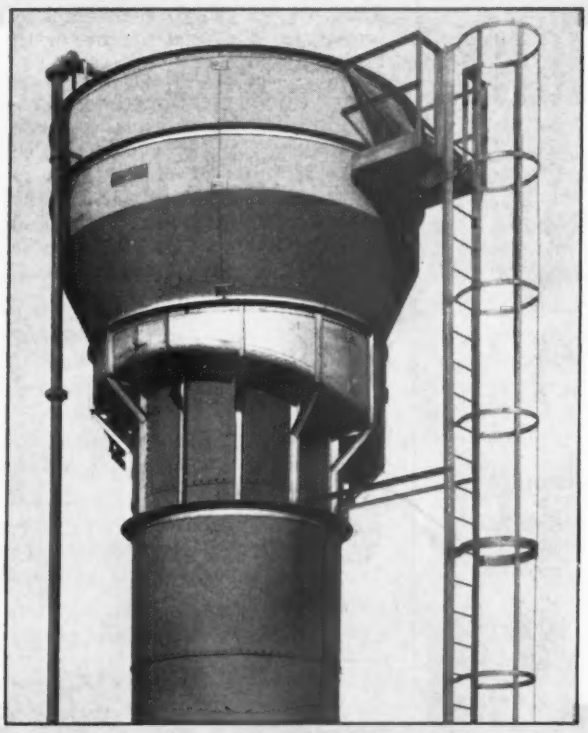
*Location of test installation on request.

OPERATING PERIOD

TEST NO.	DURATION	AIR BLAST	EFFLUENT DUST CONCENTRATION
1	40 Minutes	3,600 CFM	0.42# per 1,000# Exhaust
2	40 Minutes	4,500 CFM	0.33# per 1,000# Exhaust
3	30 Minutes	3,500 CFM	0.43# per 1,000# Exhaust
5	31 Minutes	3,800 CFM	0.40# per 1,000# Exhaust
6	30 Minutes	4,500 CFM	0.56# per 1,000# Exhaust
8	13 Minutes	3,900 CFM	0.39# per 1,000# Exhaust
9	30 Minutes	—	0.41# per 1,000# Exhaust
10	30 Minutes	3,500 CFM	0.48# per 1,000# Exhaust
			Av. 0.43# per 1,000# Exhaust

RUN DOWN PERIOD

4	30 Minutes	4,750 CFM	0.66# per 1,000# Exhaust
7	32 Minutes	—	0.72# per 1,000# Exhaust



You, too, can expect the performance from Schneible Cupola Collectors that is shown in the tests above, made recently at an eastern foundry.

What this performance means to you is money saved on plant clean-up costs and replacement of expensive roofs, sash, gutters and other facilities corroded by fly-ash and cinders. This saving alone can more than return the investment in "SW" Cupola Collectors.

Improved working conditions, employee relations, and community good will are other tangible benefits from cleaner, purer air around your plant.

Schneible builds for permanence and lowest upkeep costs. Simplicity of design assures minimum attention. The many patented money-saving features are found only in Schneible "SW" Cupola Collectors.

Take a dust count of your plant or, better still, get a recommendation from the local Schneible representative.

Our Bulletin No. 554 containing diagrams and other pertinent information is yours for the asking.

CLAUDE B. SCHNEIBLE COMPANY
P. O. Box 81, North End Station • Detroit 2, Michigan

Cable Address: CBSCO
European Licensee: Elex S. A., Zurich, Switzerland

SCHNEIBLE

LATE NEWS

OCTOBER 25 1954

FOUNDRY TRAINING: Only about 7 per cent of all foundries conduct a training department. However, nearly one-half of the largest foundries—those with 1000 or more employees—do so. This is one of many findings obtained from a survey now being completed by the Bureau of Apprenticeship, U. S. Department of Labor. Most large foundries employ a director of training; in smaller plants the work is handled in most cases by the personnel director, foreman or superintendent.

CLEANING ROOM: Lecture course covering all phases of casting cleaning practices is scheduled by the AFS Metropolitan Chapter's Educational Committee. It will be held 7 to 9 p.m. the evenings of Nov. 9, 11, 16 and 18 at the Kidde Physics Auditorium, Stevens Institute of Technology, Hoboken, N. J. More details are obtainable from Fred Wiehl, 121 Paterson Rd., Fanwood, N. J.

JOBS SAFER: Manufacturing industry's accident rate last year was the lowest in history. The Department of Labor says the national average in 1953 was 13.4, against 14.3 in 1952. Rate for 669 reporting gray iron and malleable foundries dropped from 30.5 to 27.3 last year. This compares with reductions of from 24.7 to 21.5 for 138 steel foundries and from 23.5 to 23.0 for 411 nonferrous foundries. Blast furnaces and steel mills had a frequency rate of 5.5 last year.

MAGNESIUM ASSOCIATION: Talks by Dr. Arthur Compton, Nobel prize-winning physicist, and A. J. Bell, Johns Hopkins University's Applied Physics Laboratory, will highlight luncheon sessions of the tenth annual meeting of the Magnesium Association. It will be held Nov. 15-17 at the Hotel Chase, St. Louis. Discussions of cast magnesium include: "Designing for Magnesium Castings" by E. W. Moir, Howard Foundry Co., and "Experience and Experiment in Hot Chamber Die Casting of Magnesium" by F. C. Bennett, Dow Chemical Co.

TITANIUM CASTINGS: National Research Corp., Cambridge, Mass., has added a new titanium casting furnace to its metallurgical research department. An arc melting vacuum skull furnace, it can pour 50 pounds of titanium per charge. First licensee to use the National Research titanium shape casting process is Titanium Casting Corp., division of Howard Foundry Co., Chicago.

ICI TO MEET: A number of subjects relating to the production of investment casting will be discussed at the second annual meeting of the Investment Casting Institute, at the Congress Hotel, Chicago, Nov. 3-4. Technical matters will occupy the second day's program. They include such subjects as theory and practice of degassing metals, a study of investments, relation of the test bar to properties of production castings, flow characteristics of liquids entering transparent molds, material specifications, factors relating to dimensional control, and standard test procedures.

NEW PLANT: Mercast Corp., New York, plans to build a new plant in LaVerne, Calif., 30 miles east of Los Angeles. To include 12,500 square feet, the plant is to be in full operation early next year. Mercast, an affiliate of the Atlas Corp., controls rights for the production of investment castings by the use of frozen mercury patterns. Its licensees are Alloy Precision Castings Co., Kolcast Industries Inc. and Thompson Products Inc., all of Cleveland.

CLOSING DOWN: Ferro Machine & Foundry Inc., Cleveland, closed its gray iron foundry the end of September. At the same time the Henry Furnace Co., Medina, O., shut down, and its equipment is scheduled to be auctioned Nov. 2. Public auction also has been announced of property of Chicago Steel Foundry Co., Chicago.

SMOG: The general public is responsible for nearly three-fourths of the contaminants that result in the smog plaguing Los Angeles. This is indicated in a highly detailed report on the subject issued by the Stanford Research Institute. Of the approximately 2600 tons of pollutants emitted daily, the petroleum industry ac-

counts for about 400 tons and other industry about 320 tons. The balance is said to come from the burning of gasoline, natural gas and trash; automobile exhaust is by far the major factor. Los Angeles' unusual topography and the presence of a high percentage of ozone in the atmosphere there aggravate conditions.

OBITUARY: John E. Schaible, 56, vice president and sales manager, Crucible Steel Casting Co., Milwaukee, died in Chicago, Oct. 15. He had been with the company since 1926. . . . Henry Chamberlain, who retired in 1946 as board chairman of the Los Angeles Steel Castings Co., died Oct. 9 . . . Dr. Ing. Geilenkirchen, 78, past secretary of the German Foundry Association, died in Florence, Sept. 26, while attending the International Foundry Congress.

BRITISH PRODUCTIVITY: Last in a series of reports by British teams which visited nearly 2000 U. S. industrial plants the last five years has been published by the British Productivity Council. A group of British steel foundrymen who came here in early 1949 was the first of 67 such teams. They sought to find out how America achieves its high productivity and how these methods could be applied to their own operations. The plan served as a pattern for studies by teams from other countries participating in the U. S. technical assistance and technical exchange programs. These programs brought about 15,000 men and women from western European countries for U. S. studies during the last five years under sponsorship of the Foreign Operations Administration and its predecessor agencies.

MISCELLANY: Reichhold Chemicals Inc. has increased its price of phenolic resins used in shell molding to 28 cents a pound for truckload and carload lots . . . Primary aluminum production in September totaled about 120,000 tons, off 4 per cent from August but 10 per cent larger than a year ago . . . United States Graphite Co., Division of the Wickes Corp., Saginaw, Mich., is observing its 100th year . . . Quaker Rubber Corp. and its recently acquired Pioneer Rubber Mills, Pittsburg, Calif., are merging Pacific coast operations under the name Quaker Pioneer Rubber Mills, Division of H. K. Porter Co. Inc., with main office and factory at Pittsburg.

PRICES OF FOUNDRY METALS AND COKE (As of Oct. 25, 1954)

FOUNDRY COKE

(Per net ton, f.o.b. ovens)

BEEHIVE	
Connellsville	$16.50–17.00
OVEN	
Birmingham	$22.65
Buffalo	25.00
Chicago	24.50
Detroit	25.50
Erie, Pa.	25.00
Everett, Mass.	23.50
Indianapolis	24.25
Kearney, N. J.	24.00
Lone Star, Tex.	18.50
Milwaukee	25.25
Montreal, Que.	26.25
Painesville, O.	25.50
Philadelphia	23.00
Portsmouth, O.	24.00
St. Louis, del.	26.00
St. Paul	23.75
Swedeland, Pa.	23.00
Terre Haute, Ind.	24.05

PIG IRON

(Per gross ton f.o.b. furnace)

	No. 2 Foundry	Malleable
Bethlehem, Pa.	$58.50	$59.00
Birmingham	52.88	....
Buffalo	56.50	57.00
Chicago	56.50	56.50
Cleveland	56.50	56.50
Everett, Mass.	61.00	61.50
Fontana, Calif.	62.50	....
Geneva, Utah	56.50	....
Granite City, Ill.	58.40	58.90
Lone Star, Tex.	52.50	52.50
Neville Island (Pittsburgh)	56.50	56.50
Steelton, Pa.	58.50	59.00
Swedeland, Pa.	58.50	59.00
Toledo, O.	56.50	56.50
Troy, N. Y.	58.50	59.00
Youngstown, O.	....	56.50

NONFERROUS INGOT

(Cents per pound, carlots)

BRASS AND BRONZE: Red brass, No. 115, 27.00; tin bronze, No. 225, 39.00; No. 245, 33.25; high-leaded tin bronze, No. 305, 31.50; No. 1 yellow, No. 405, 23.25; manganese bronze, No. 421, 26.75.

ALUMINUM: 99 per cent plus, primary ingots 22.2. Secondary No. 12 alloy 20.25–20.75. Deoxidizing grades: No. 1 21.50–22.00; No. 4 18.50–19.00.

MAGNESIUM: 99.8 per cent notched ingots 27.75, f.o.b. Freeport, Tex. (10,000 lb or more).

COPPER: Electrolytic 30.00, delivered Connecticut valley.

ZINC: High grade 12.85, delivered. Die casting alloy 15.50, delivered.

IRON AND STEEL SCRAP

(Consumer prices per gross ton delivered, except as otherwise noted)

	No. 1 Heavy Melting Steel	No. 1 Cupola Cast	Heavy Breakable Cast	Clean Auto Cast	Machinery Cast	Malleable	Short Steel Rails
Birmingham	$26.00–27.00	**$45.00–46.00	.....	.....	.....	.....	$40.00–41.00
Boston*	**22.00–23.00	**29.00–30.00	.....	.....	**32.00–33.00	.....	.....
Buffalo	30.00–31.00	**36.00–37.00	.....	.....	**41.00–42.00	.....	42.00–43.00
Chicago	32.00–34.00	39.00–40.00	.....	43.00–45.00	43.00–45.00	42.00–44.00	50.00–52.00
Cincinnati*	**29.00–30.00	**39.00	**36.00	.....	**45.00	.....	**46.00–47.00
Cleveland	32.00–33.00	44.00–45.00	30.00–31.00	44.00–45.00	44.00–45.00	44.00–45.00	46.00–49.00
Detroit*	**25.00	**34.00	**25.00	**38.00	.....	**30.00	.....
Los Angeles	20.00	**42.00–44.00	.....	.....	.....	.....	.....
New York*	26.00	29.00–30.00	.....	.....	.....	.....	.....
Philadelphia	31.50	35.00–36.00	36.00	.....	42.00–43.00	37.00	.....
Pittsburgh	32.00–33.00	37.00–38.00	31.00–32.00	.....	42.00–43.00	.....	44.00–46.00
St. Louis*	30.00	38.00	29.00	41.00	.....	.....	46.00
San Francisco	20.00	43.00–46.00	36.00	39.00	43.00	.....	.....
Seattle	25.00	**32.00–35.00	**23.00	.....	.....	.....	.....

* Brokers' buying prices. ** F.o.b. shipping point

Leader in FOUNDRY SANDS Since 1841

WHITEHEAD'S
DORCHESTER MOLDING SANDS
MOISTURE CONTROLLED
GUARANTEED MOISTURE CONTENT
NOT MORE THAN 6%

These natural bonded sands and gravels are widely used for Molds and Cores in Iron, Steel, Alloy, and Non-Ferrous Castings. They are noted for colloidal clay giving high green and dry strength. Because of low fines in the grain distribution, these sands have high permeability.

1. Cannot freeze into solid lumps.
2. Controlled moisture means lowered delivered costs.
3. Ready to use on arrival at foundry.
4. Easier handling.

WHITEHEAD'S
ALBANY MOLDING SANDS

FOR SPECIAL WORK
ARE KNOWN THE WORLD OVER

Extensive deposits supply users in the U. S., Canada, and foreign countries.

Sand Plants
DIVIDING CREEK, N. J.
DORCHESTER, N. J.
McCONNELLSVILLE, N. J.
SAYREVILLE, N. J.
MARION, MASS.
WAREHAM, MASS.

PROVINCETOWN, MASS.
ALBANY, N. Y.
MECHANICSVILLE, N. Y.
WEMPLE, N. Y.
GANSEVOORT, N. Y.

WHITEHEAD'S
McCONNELLSVILLE and
DIVIDING CREEK
Unbonded Silica Sands
for fine finish
castings.

Whitehead Brothers COMPANY

Established 1841

NEW YORK OFFICE
324 West 23rd St., New York 11, N. Y.
NEW ENGLAND OFFICE
17 Exchange Place, Providence 1, R. I.

Manufacturers of:

LYQUAGRIP
Ready-to-use core paste

DOB-IT
Ready-to-use core mudding compound

JOINT-SEAL
Plastic compound for perfect sealing

LYQUAFLOUR
For cleaner surface, better shakeout

LYQUAFACE
The liquid sand grain coating

bake cores of widely varying sizes and shapes in

COLEMAN TOWER® OVENS

Only Coleman Tower Ovens have the exclusive features of accurate controls and flexibility which permit you to bake cores of widely different sizes and shapes at the same time with consistent uniformity.

A midwestern foundryman writes "...cores ranging in size from small pin type weighing a few ounces to cores weighing over 100 pounds are baked in one cycle with no rebake, cooled and ready for finishing. Core breakage and rejects are negligible compared to former practice. We are more than pleased with our entire operation."

No other method bakes cores at lower cost because of these Coleman Tower Oven features:

GREATEST SAVINGS IN LABOR resulting from the most efficient handling methods.

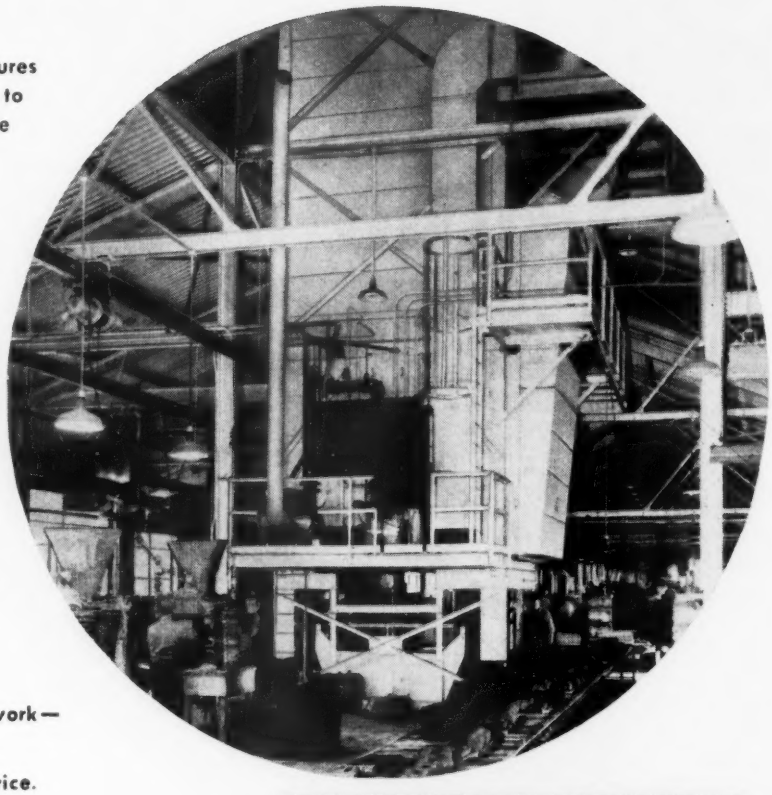
MOST EFFICIENT USE of your available production floor space.

LARGEST FUEL SAVINGS by using the most economical fuel available.

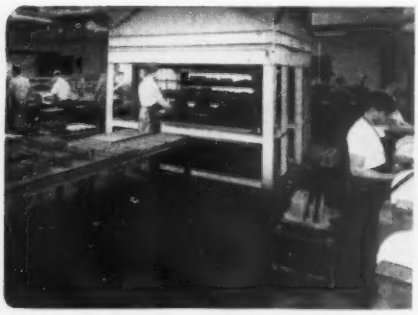
USE OF MOST SATISFACTORY BINDERS for your work—oil or resin.

LOWEST MAINTENANCE COST for upkeep and service.

Write for Bulletin C 54



Coleman Tower Ovens use only 25% of floor space required by batch type ovens of same capacity.



Patented Open Center permits close, efficient grouping of coremakers around the oven... results in increased coremaker productivity.

3-way loading feature increases accessibility 300% over ordinary vertical oven designs.

Recuperative cooling system "smokes-off" and cools the cores before they reach unload station.

Coleman Tower Ovens quickly pay for themselves out of savings in labor, fuel and by reducing losses. Our engineers are available, without obligation, to make practical recommendations for your particular requirements.

A COMPLETE RANGE OF TYPES AND SIZES

for every core baking and mold drying requirement:

Tower Ovens • Horizontal Conveyor Ovens
Car-Type Core Ovens • Car-Type Mold Ovens
Transrack Ovens • Rolling Drawer Ovens
Portable Core Ovens • Portable Mold Dryers
Dielectric Core Ovens

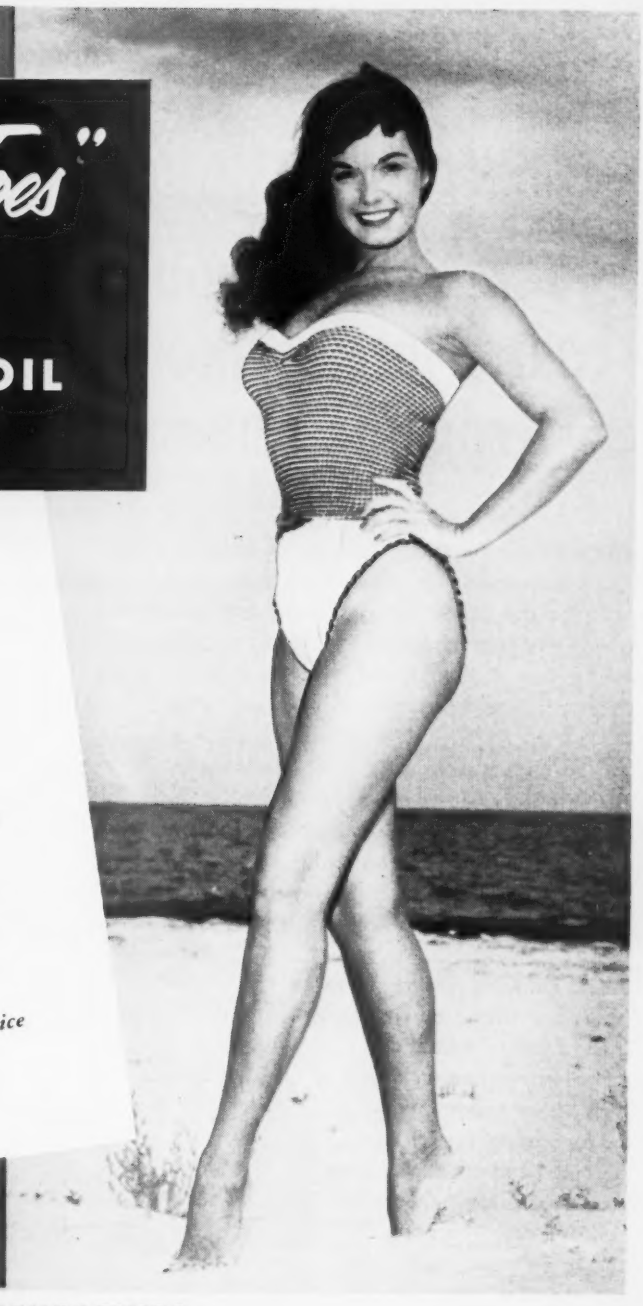
MEMBER FEMA

THE FOUNDRY EQUIPMENT COMPANY
1821 COLUMBUS ROAD CLEVELAND 13, OHIO

WORLD'S OLDEST AND LARGEST FOUNDRY OVEN SPECIALISTS

Keep "on Your Toes" with

SMITH L-O CORE OIL



Put Smith L-O on the job and you'll notice an appreciable gain in savings of time and effort — as well as production of clean, accurate cores. Regardless of your foundry set-up, you can order a grade of Smith L-O ideally suited to your needs. And, that particular grade can well be the one that is recommended by our practical foundry service men. If you need assistance in developing sounder cores, call in a Smith representative to make a study of your production . . . his analysis and solution of your problem will prove most valuable. Yes . . . look first to Smith L-O — the name that stands for a *service* as well as a *product*.

SMITH REPRESENTATIVES

- ALGONQUIN CHEMICAL CO., INC. Hamburg, Pennsylvania
- FOUNDRIES MATERIALS CO. Coldwater, Michigan
- FOUNDRY SERVICE CO. Birmingham, Alabama
- F. F. SHORTSLEEVE Elmira, New York
- MALCOLM G. STEVENS Arlington, Massachusetts
- PACIFIC GRAPHITE CO., INC. Los Angeles 22, California
- ST. LOUIS COKE & FOUNDRY SUPPLY CO. St. Louis, Missouri
- WESTERN FOUNDRY SAND CO. Seattle, Washington
- WESTERN INDUSTRIAL SUPPLY CO. Portland 14, Oregon

Smith L-O Core Oil

ROD DIP **LIQUID PARTING**

SMITH OIL & REFINING CO.

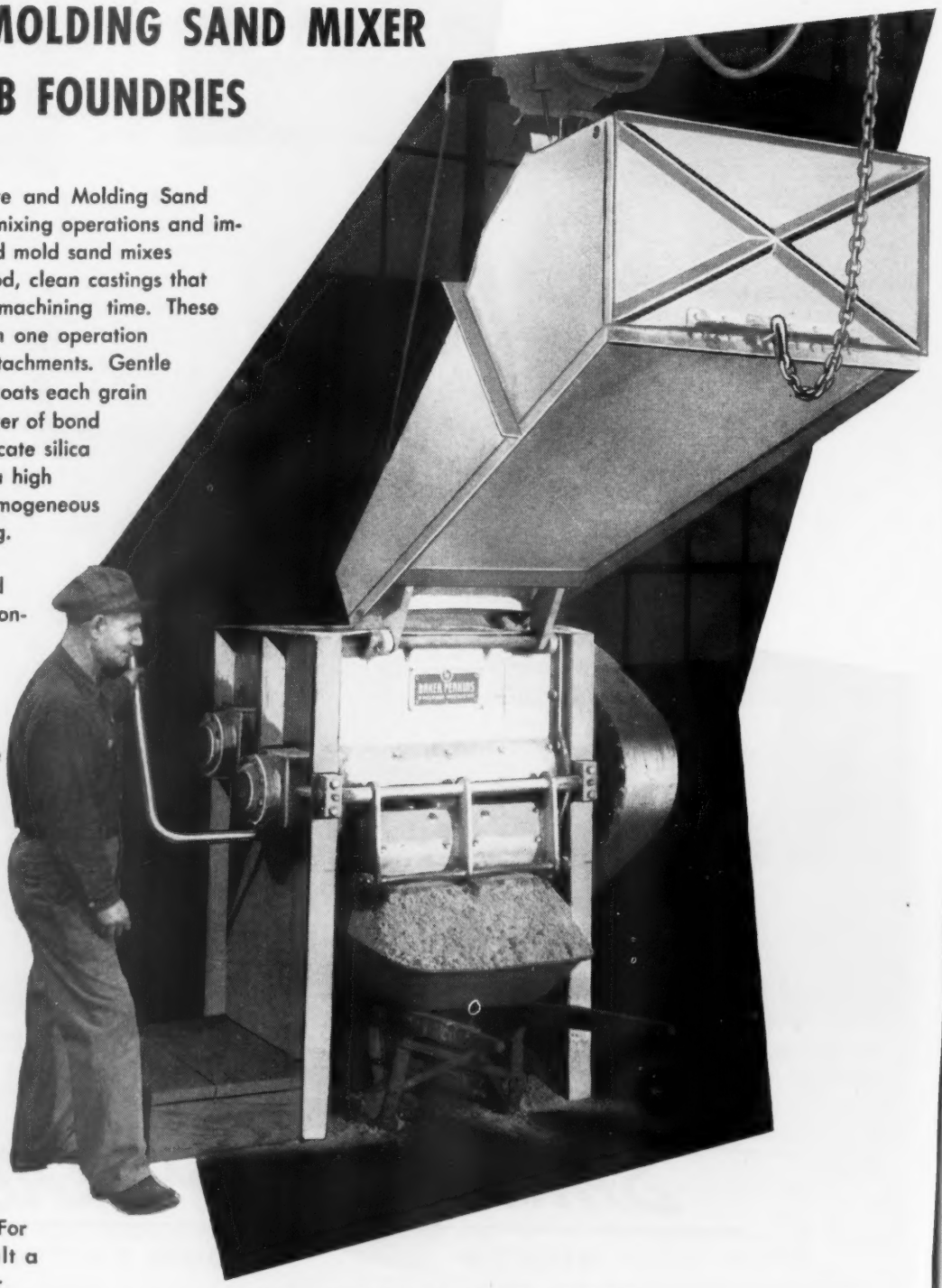
MANUFACTURERS OF L-O AND CERTIFIED CORE OILS
INDUSTRIAL OILS DIVISION • ROCKFORD, ILLINOIS

BAKER PERKINS SIZE 14

BATCH TYPE UNIDOR CORE AND MOLDING SAND MIXER FOR JOB FOUNDRIES

BAKER PERKINS Unidor Core and Molding Sand Mixers help speed up sand mixing operations and improve the quality of core and mold sand mixes so that you can produce good, clean castings that require less shakeout and machining time. These mixers rub, stir and knead in one operation without special aerating attachments. Gentle and thorough mixing action coats each grain of sand evenly with a thin layer of bond without breaking up the delicate silica grains. The mixed sand has a high degree of permeability, is homogeneous and does not require riddling.

BAKER PERKINS Unidor Sand Mixers are strong and well constructed with a simplified operating mechanism that helps keep maintenance and operating costs low. The No. 14 Mixer shown here has a fabricated steel trough shell and cast iron ends, renewable steel liners, and cast steel Sigma blades with renewable wearing shoes of hardened steel. It has a working capacity of 5.5 cu. ft. BAKER PERKINS Unidor Mixers are available for job foundries in capacities up to 35 cu. ft. These models can be adapted to or equipped with air or electrically operated skip hoists. A laboratory model with a working capacity of 1500 to 2000 grams is also available. For complete information, consult a BAKER PERKINS sales engineer or write us today.



BAKER PERKINS INC.

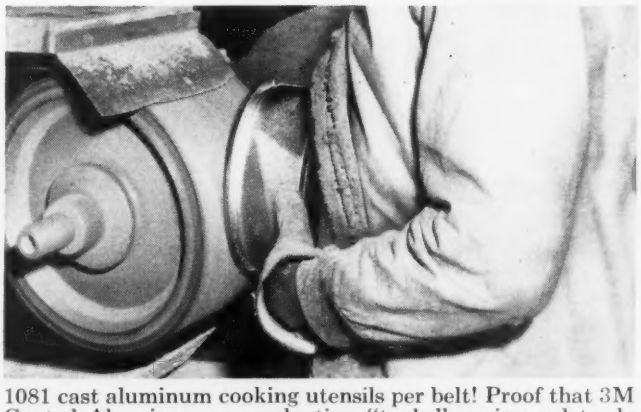
CHEMICAL MACHINERY DIVISION

SAGINAW, MICHIGAN

276

3M METHOD—better from start to finish

3M Representative helps aluminum foundry cut abrasive belt costs 54%



1081 cast aluminum cooking utensils per belt! Proof that 3M Coated Abrasives are production "tools," engineered to do better, faster grinding and finishing at lower cost to you.

Although Century Metalcraft Corp., Los Angeles, Calif., was satisfied with the way Three-M-ite Cloth belts were grinding the bottoms of "Guardian Service" cast aluminum cooking utensils, a 3M Representative saw a way they could profit by switching to "Wetordry" Type Belts. The new belts lasted so much longer that belt costs were cut 54%.

The 3M Representative also suggested using a Resin type belt for the finishing operation. Result: production per belt increased over 100% . . . from 461 to 1081.

Keeping customers up-to-date is an important job for the 3M Representative. Remember, he's a coated abrasives expert who can help *you* cut costs and increase production in *your* foundry. Send coupon today for additional information.

3M ABRASIVE BELTS

Made in U.S.A. by Minnesota Mining and Mfg. Co., St. Paul 6, Minn.—also makers of "Scotch" Brand Pressure-Sensitive Tapes, "Scotch" Brand Magnetic Tape, "Underseal" Rubberized Coating, "Scotchlite" Reflective Sheeting, "Safety-Walk" Non-slip Surfacing, "3M" Adhesives. General Export: 122 E. 42nd St., New York 17, N.Y. In Canada: London, Ont., Can.

Send today for **FREE** *Booklet*

Minnesota Mining and Mfg. Co.
Dept. F-114, St. Paul 6, Minn.

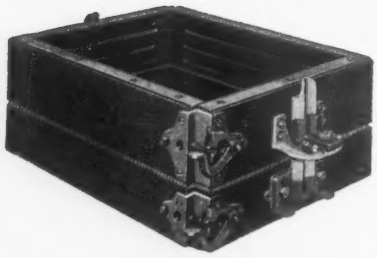
☐ Send me free booklet on finishing non-ferrous metals
☐ I'd like to talk to a 3M Representative

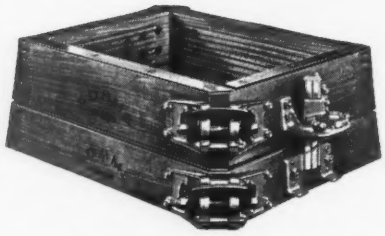
NAME _____ TITLE _____

COMPANY _____

ADDRESS _____

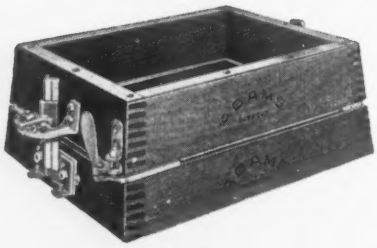
CITY _____ ZONE ____ STATE _____

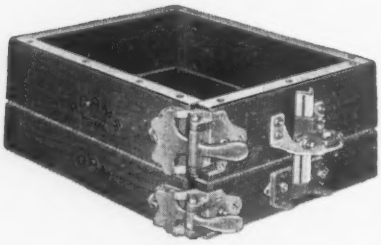


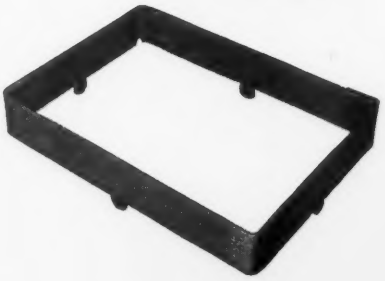


ADAMS

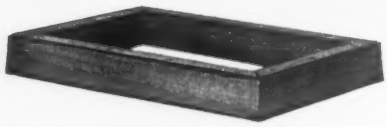
FLASK EQUIPMENT

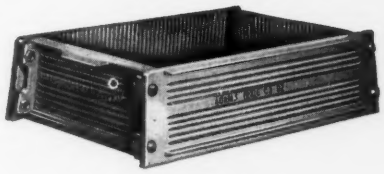




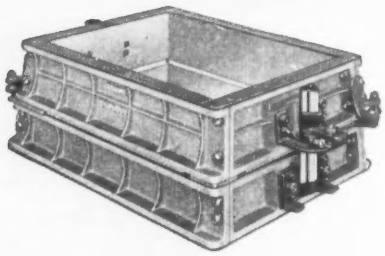


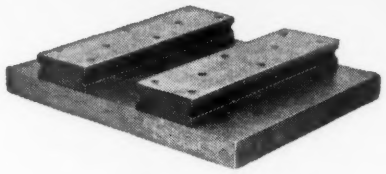
ALL ADAMS Flasks available with Pins and Ears to interchange with your present Pattern Plate Guide.

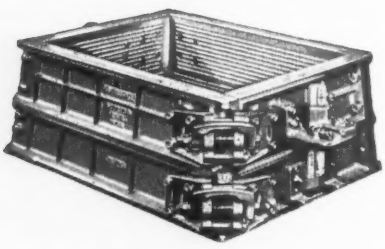


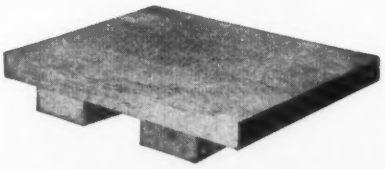


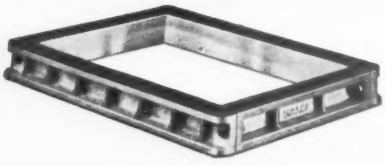
Cherry Snap Flasks
Cherry Easy-Off Flasks
Aluminum Slip Flasks
Aluminum Easy-Off Flasks
Cherry Upsets
Aluminum Upsets
Cast Iron or Aluminum Jackets
Steel Jackets
Cherry Presser Boards
Wood Bottom Boards
Steel Bottom Plates, No. 1 and No. 2
Steel Bands
Steel Upsets

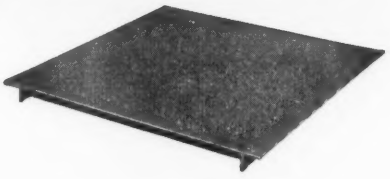












ALWAYS BUY ADAMS

The finest in Quality Equipment

The ADAMS Company

ESTABLISHED 1883

MOLDING MACHINES and FLASK EQUIPMENT

700 FOSTER STREET, DUBUQUE, IOWA, U.S.A.

Move More with a **MICHIGAN**

Handling scrap metal and waste sand every day at AUTO SPECIALTIES FOUNDRY

JOB FACTS

Job: Unloading and piling scrap, loading trucks for delivery to furnaces; handling waste sand; steel setting and erection, plant maintenance work

Machine: MICHIGAN T6K crane, with 25′ boom—29″ magnet or ⅜ yard clamshell

Owner: Riverside Foundry Division of Auto Specialties Mfg. Co., St. Joseph, Michigan

Performance: Versatile and completely satisfactory for many jobs. Upkeep expense considered very low.

A busy machine of many uses, at the Riverside Foundry Division of Auto Specialties Manufacturing Co., the MICHIGAN T6K was steadily on the job for five solid years, working every day, before its first overhaul.

Equipped with magnet or clamshell, the husky air-controlled MICHIGAN* does all handling of scrap: unloads it from cars, piles it, loads it into trucks for delivery to furnaces. With a clamshell it handles waste sand to be dumped, then follows to spread the waste. In addition it excavates and loads new sand; and handles steel erection and plant maintenance jobs. A versatile and necessary tool that performs with great satisfaction and little upkeep, plant officials report.

Have you looked into how this up-to-date handling method can save time and money for you? It's worth investigation—which costs nothing, may lead to substantial cuts in costs. Talk to your MICHIGAN dealer—and send for interesting air control booklet, "More Yardage Through Air Power." Use the coupon.

*A Trademark of Clark Equipment Company

CLARK EQUIPMENT

Construction Machinery Division
CLARK EQUIPMENT COMPANY
442 Second Street
Benton Harbor, Michigan

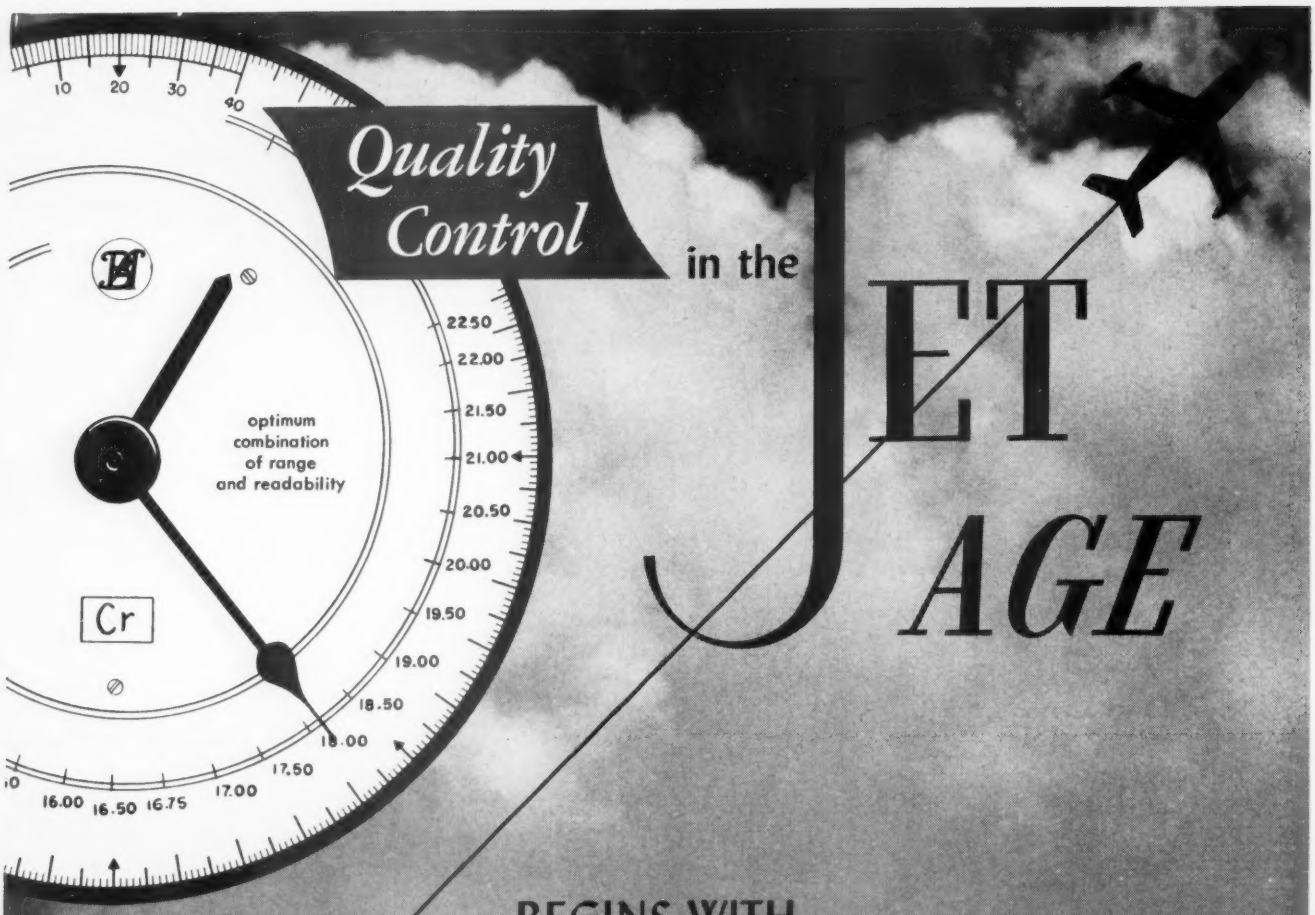
Please send the booklet "More Yardage Through Air Power."

Name_____

Firm_____

Address_____

City_____ Zone_____ State_____



BEGINS WITH DIRECT READING ANALYSIS

- As many as 60 elements analyzed in seconds.
- Drastic reduction in furnace waiting time.
- Laboratory costs cut by two-thirds.
- Productivity greatly increased.
- A higher quality product is ensured.

Baird Associates spectrographs and spectrometers are discussed in technical bulletins #32 and #34. Please write for your free copy to Dept. SW.

Baird Associates, Inc.

33 UNIVERSITY ROAD, CAMBRIDGE 38, MASSACHUSETTS, U.S.A.

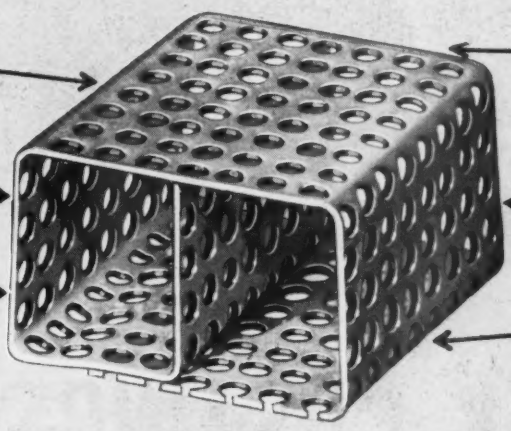
the perfect COMBINATION of SHAPE and SIZE for LIGHT CORE castings

fine FANNER perforated chaplets

PERFORATIONS
Large number of perforations in light metal insure perfect fusion in light castings.

LARGE SUPPORT AREA
Widely distributed support area holds core more securely in place.

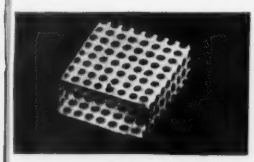
FLEXIBLE SHAPE
Made in 10 styles in any shape or contour required, flat, or curved to any radius, wedge-shape, bridged or with extended ends.



WILL NOT CHILL
Because of the large perforated area, there is no concentration of metal at any point to chill and cause leaks.

ACCURATELY MADE
Produced to exacting standards on specially designed machines to meet specifications.

PERFECT VENT
There are no gas or air pockets to cause "blow holes", so that perfect ventilation is secured.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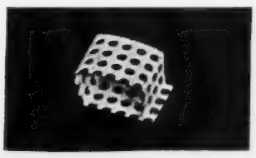
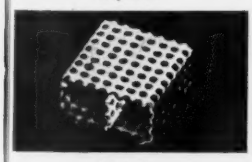
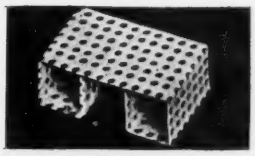
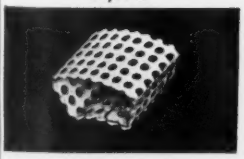
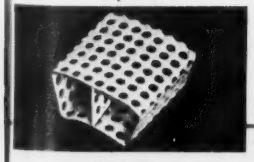

Style F


Style B

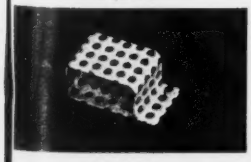

Style G


Style C

Style H


Style D

Style I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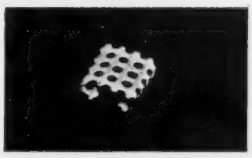
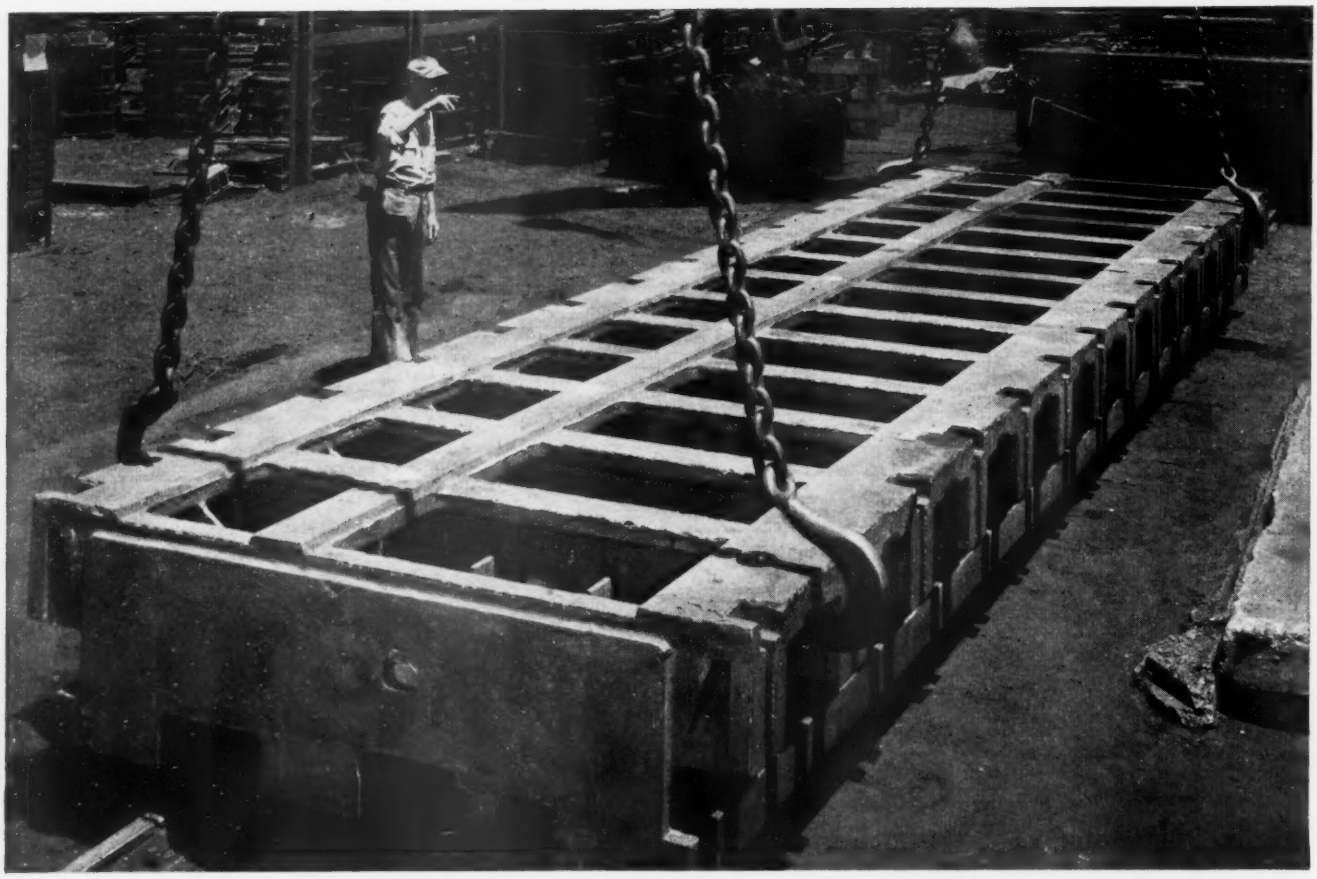

Style J

● Here is the most versatile of chaplets for light core work. Gives you the exact features you want to fit your particular need—the right shape, the right size, the right construction, the right material. Fine Fanner Perforated Chaplets are ideally suited to a wide variety of applications where there is no need for heavy core support. Made of tin coated sheet steel for ferrous castings—of aluminum, copper or brass for use in castings of these metals. The perforated design offers a great number of advantages; more perfect fusion in light sections, perfect ventilation eliminates pockets that cause "blow holes", there is no concentration of metal at any point to chill and result in leaks. Wide support area holds core securely. Shape can be designed to fit almost any contour. They are available in a large number of types, some of which are illustrated, and an extremely wide range of thicknesses and sizes. Get acquainted with fine Fanner Perforated Chaplets by sending for a free copy of the Fanner Chaplet Catalog today.

THE FANNER MANUFACTURING CO.
Designers and Manufacturers of Fine Fanner Chaplets and Chills
BROOKSIDE PARK **CLEVELAND 9, OHIO**



QUALITY CASTING—All interior and exterior surfaces of this 56,000 pound iron casting were poured against Truline-bonded cores. Lack of erosion, scabs, and buckles, and smooth appearance of semi-finished casting demonstrates Truline's ability to do the job.

QUALITY CASTINGS FROM TRULINE®-BONDED CORES

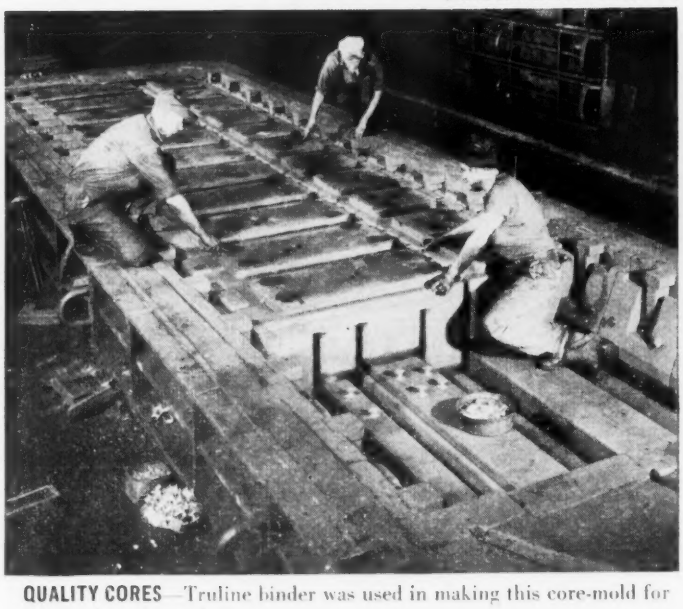
Quality castings begin with quality cores. That's why more and more foundries are turning to Truline for cores strong enough to resist the erosive tendencies of poured metal, yet collapsible enough to produce crack-free castings.

In the core room, in the molds, and in the cleaning room, the use of fast-baking Truline Binder means more efficient and economical operations.

Your Truline Binder serviceman will be glad to assist you in formulating your core sand mixes for quality castings. Write:

Naval Stores Department
HERCULES POWDER COMPANY
920 King St., Wilmington 99, Del.

(PHOTOS COURTESY ELYRIA FOUNDRY CO.)



QUALITY CORES—Truline binder was used in making this core-mold for the casting pictured above.

NF54-3

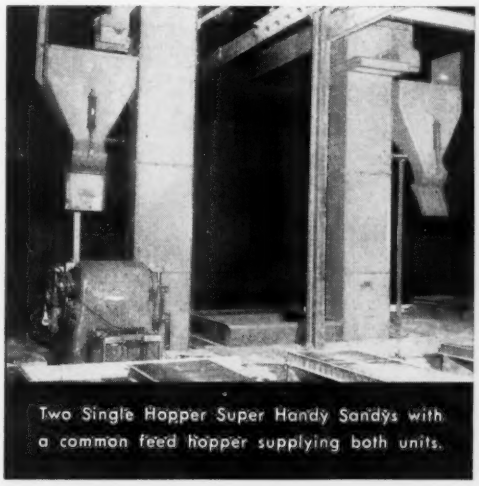
The SUPER HANDY SANDY

A HIGH CAPACITY INDIVIDUAL-FLOOR SAND HANDLING UNIT

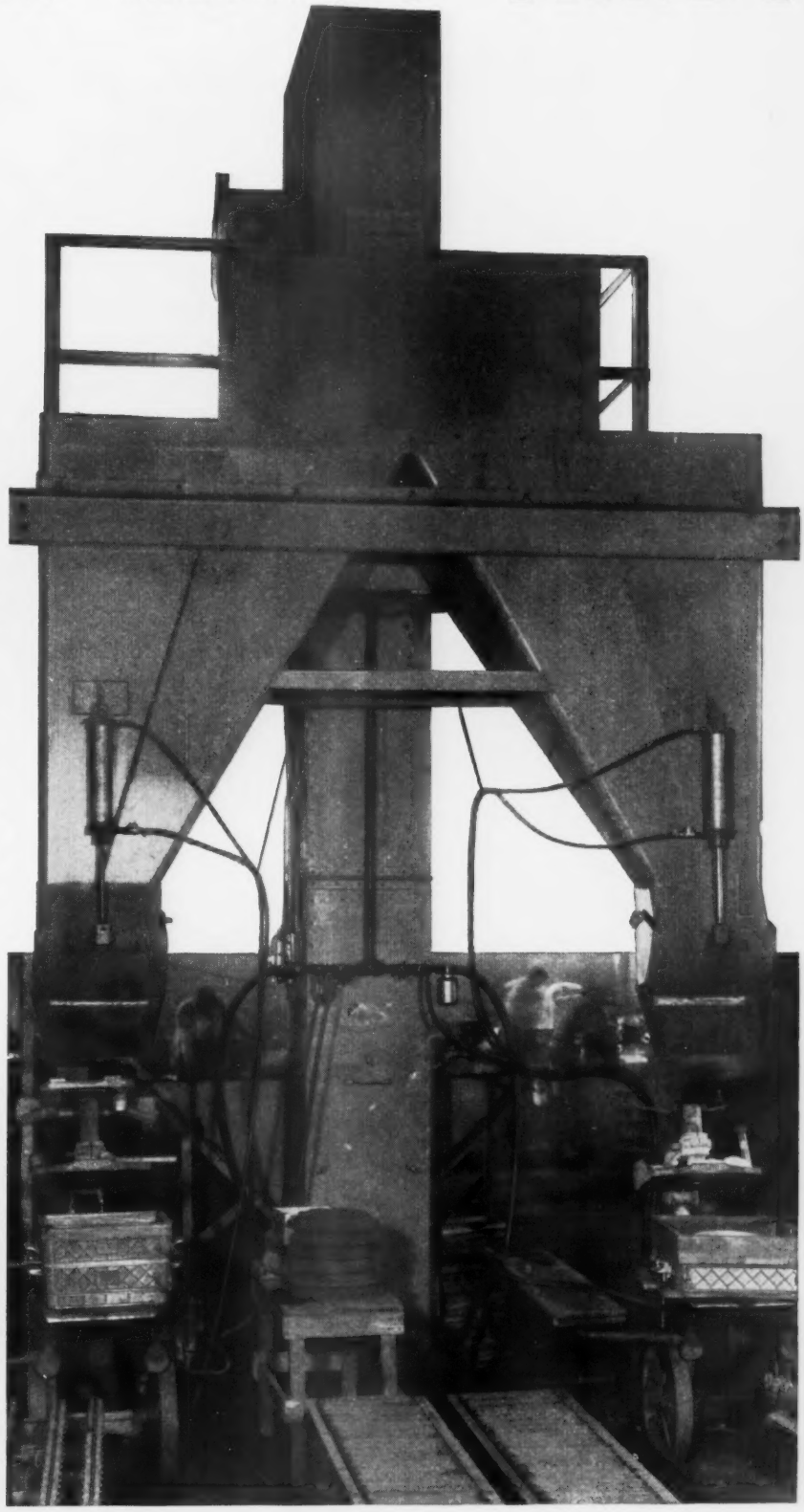
fills large flasks in seconds— that before took several man hours

This unit can handle up to 50 tons of sand per hour into overhead hoppers where it is available to the molders without effort. Super Handy Sandy's big sand capacity makes it ideally suited for use with large molding machines such as rollover machines, bumpers, and automatic molding machines.

The savings possible through use of the Super Handy Sandy are almost unbelievable. In one installation mold production on large molds has been increased 150% due to savings in shovel time alone. One molder can fill more molds than several men with shovels. He merely operates an air valve and the sand falls into the flask. Thus he spends more time making molds and less time getting ready.



Two Single Hopper Super Handy Sandys with a common feed hopper supplying both units.



A copy of "Planned Mechanization for Foundries" is yours for the asking. Write, wire, or phone today.

NEWAYGO engineering company
NEWAYGO, MICHIGAN

Manufacturers of Neway® Mold Handling, Sand Handling and Conditioning Equipment

DETROIT ELECTRIC FURNACES

Keep the Pouring Crew Busy ...and the Boss Happy!

Four Detroit ROCKING Electric Furnaces melt brass with speed and economy at Sterling Faucet Company

To keep pace with increased production schedules in the post-war boom, Sterling Faucet Company installed four 500-lb. Detroit Electric Furnaces in their Morgantown, West Virginia plant. These versatile furnaces provide fast, controlled-quality melting in the production of brass plumbing goods and fixtures. And they operate at better than average economy over flexible production runs.

Detroit furnaces use indirect arc heat for fast, efficient melting. This permits a wide temperature range for melting both ferrous and nonferrous metals. Electrodes always remain clear of the bath, minimizing carbon pickup and alloy variation.

The constant rocking action of the shell washes metal over more of the refractory surface for greater heat utilization. This also promotes longer lining life and insures a homogeneous mixture when alloying metals. With precise power regulation and automatic control, the most efficient melting cycle can be duplicated, for more uniform results at lower cost.

Other Detroit features include automatic electrode control, easy shell interchange, choice of conical or cylindrical shells, longer trouble-free service.

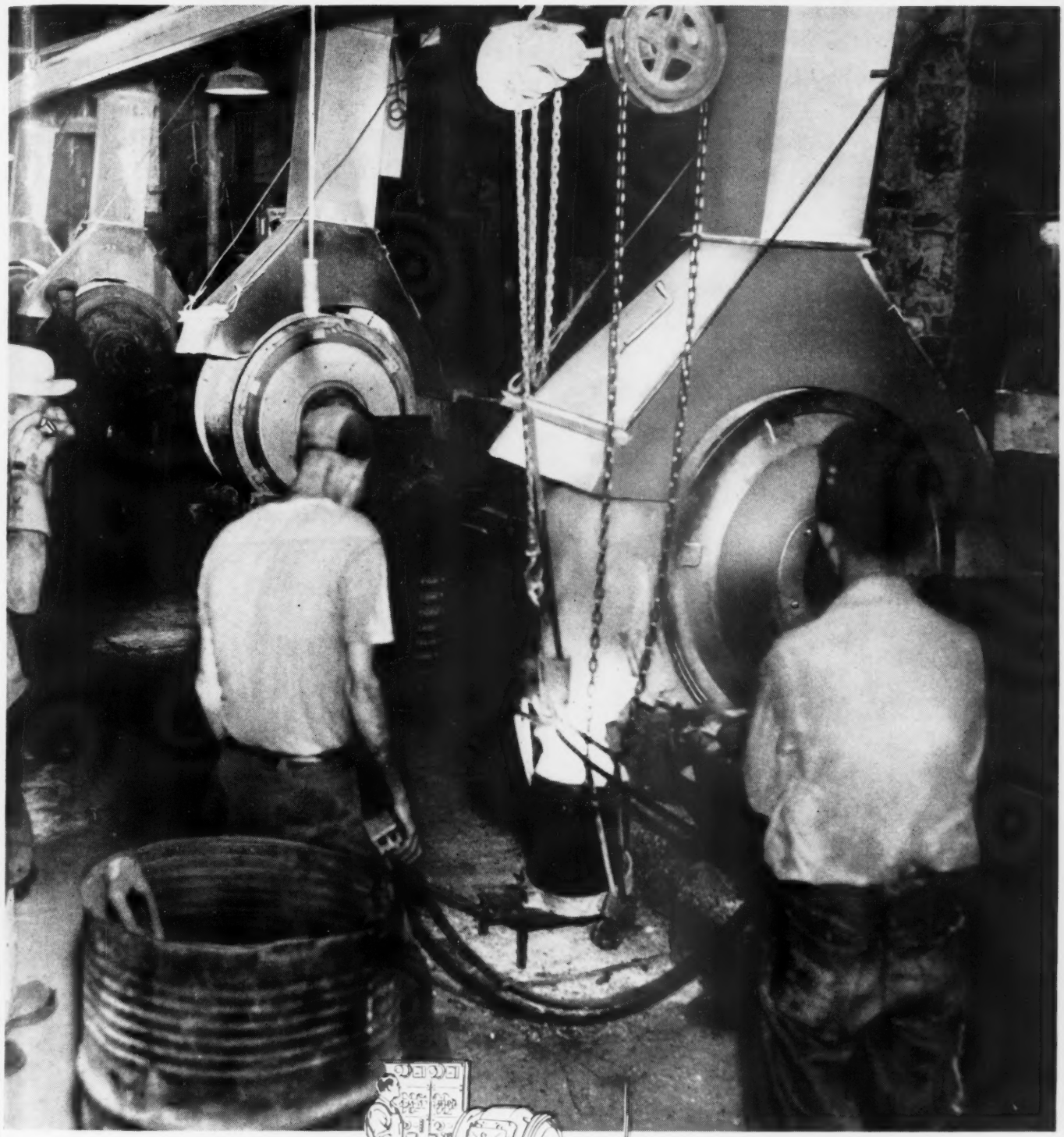
Furnace capacities from 10 to 4000 pounds.

Investigate the advantages of operating Detroit Electric furnaces—for long and short production runs—in your plant. Write today for complete information.

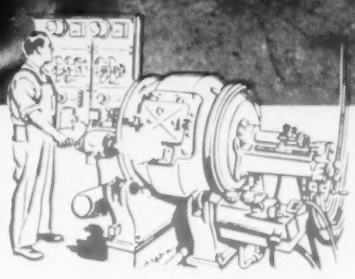
DETROIT ELECTRIC

Kuhlman Electric Company

Foreign Representatives: in BRAZIL—Equipamentos Industrias, "Eisa" Ltd., Sao Paulo; CHILE, ARGENTINA, PERU and VENEZUELA: M. Castellvi Inc., 150 Broadway,



Faster heats, better metal



ROCKING **ACTION DOES IT!**

FURNACE DIVISION

Bay City, Michigan

New York 7, N.Y.; MEXICO: Cia Proveedora de Industrias, Atenas 32-13, Apartado 27A3, Mexico 6, D. F., Mexico; EUROPE, ENGLAND: Birlec, Ltd., Birmingham.

SITUATION UNDER CONTROL

BY KEOKUK

Chief Keokuk: *"Little Chief know sailfish put up good fight. Me not know they fight this good!"*

Princess Wenatchee: *"But as usual he has the situation under control!"*

KEOKUK ELECTRO-METALS COMPANY

KEOKUK, IOWA

WENATCHEE DIVISION, WENATCHEE, WASHINGTON

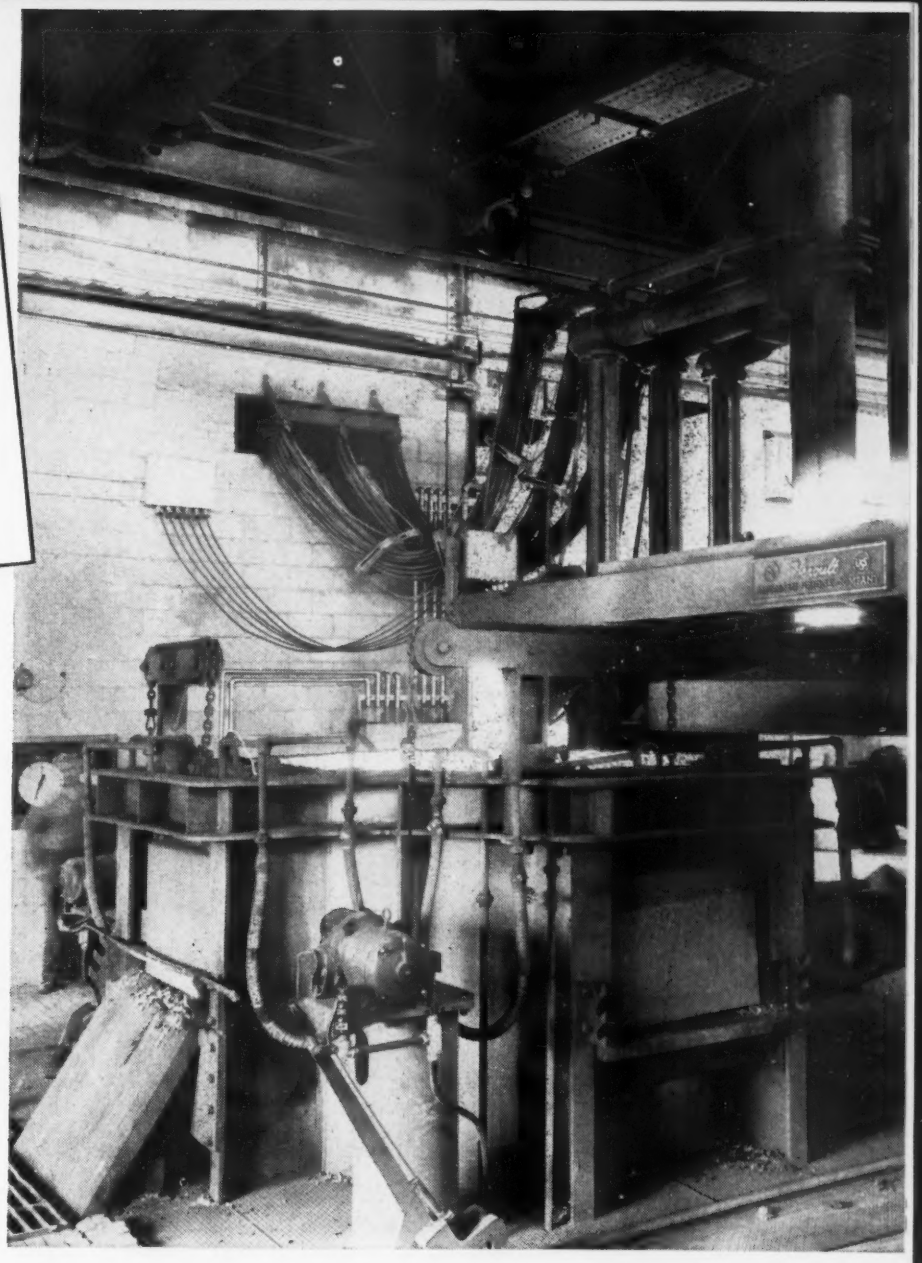
When you're looking for a way to control metal quality and costs, consider Keokuk Silvery Pig Iron. Because it is a less concentrated form of silicon, Keokuk holds silicon loss to a minimum. Car for car, pig for pig, its uniformity *never* varies! Charge Keokuk by magnet . . . or count!

Keokuk Silvery . . . the superior form of silicon introduction . . . available in 60 and 30 lb. pigs and 12½ lb. piglets . . . in regular or alloy analysis. Keokuk also manufactures high silicon metal.

SALES AGENT: MILLER AND COMPANY

332 S. Michigan Ave., Chicago 4, Illinois
3504 Carew Tower, Cincinnati 2, Ohio
8230 Forsyth Blvd., St. Louis 24, Missouri

Heroult
ELECTRIC MELTING FURNACES



The high production capacity of the Heroult makes it the foundryman's favorite furnace!

NEW CATALOGUE
Now Ready

Contains up-to-date information on Heroult Electric Melting Furnaces – types, sizes, capacities, ratings, etc. For free copy, write to our Pittsburgh office.

AVAILABLE in foundry sizes with either Gantry or swing-type roof, these widely used furnaces are equipped with the latest time- and labor-saving mechanical devices and electrical controls. They are noted for their efficient performance, low operating and maintenance costs.

We welcome an opportunity to help you select and install the foundry furnace best suited to your requirements.

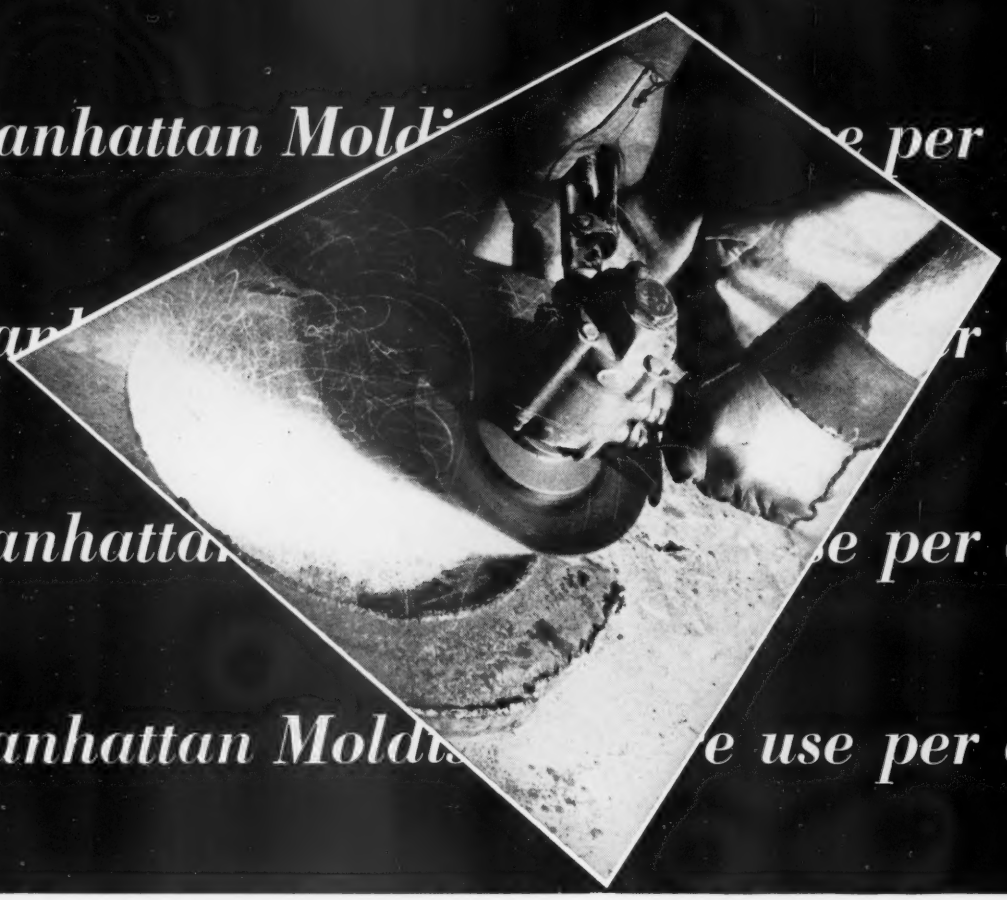
AMERICAN BRIDGE DIVISION, UNITED STATES STEEL CORPORATION
GENERAL OFFICES: 525 WILLIAM PENN PLACE, PITTSBURGH, PA.

Contracting Offices in New York, Philadelphia, Chicago, San Francisco and other principal cities.
United States Steel Export Company, New York

USS

UNITED STATES STEEL

Manhattan Moldiscs—More use per dollar



Manhattan Moldi… …e per dollar

Ma… …r dollar

Manhatta… …e per dollar

Manhattan Moldi… …e use per dollar

A FRESH CUTTING FACE . . . throughout the life of the wheel means that Manhattan Moldiscs last longer . . . retain full metal removal efficiency right down to the last usable part of the wheel. The secret—Manhattan's special molded, resinoid bonded abrasive which presents a fresh cutting surface throughout the wheel thickness, and which does not load or glaze. Actual plant tests show that Moldiscs effect important savings in faster grinding time and fewer time-outs for disc changes. For MORE USE PER DOLLAR and better quality work specify Manhattan Moldiscs. Bonded in various resiliencies from fast roughing to fine finishing. Standard size 7″ x 1/4″ x 7/8″. For speeds to 6,000 RPM. Mounting flange and nut furnished on request.

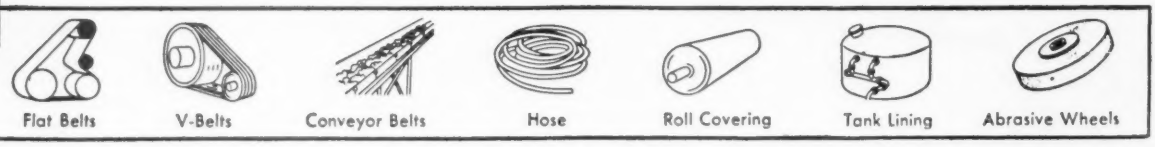
GRINDING WHEEL INSTITUTE MEMBER

WRITE TO ABRASIVE WHEEL DEPARTMENT

R/M

MANHATTAN RUBBER DIVISION — PASSAIC, NEW JERSEY

RAYBESTOS-MANHATTAN, INC.



Other R/M products include: Industrial Rubber • Fan Belts • Radiator Hose • Brake Linings • Brake Blocks • Clutch Facings
Asbestos Textiles • Teflon Products • Packings • Sintered Metal Parts • Bowling Balls

MR 943

SILICAMIX...

a new, superior, gun-shot cupola patch

Silicamix is packed in one hundred pound bags, identified by orange and blue lettering. It is also shipped in bulk when desired.

BUCKEYE SILICAMIX is a new development that provides a superior gun-shot mix for patching grey iron cupolas. Its use provides the same qualities and results from this gun-shot material that have been so popular with the well known Buckeye Silica Firestone. Buckeye Silicamix is actually small pellets of this Firestone, coated with a special refractory fire clay. When applied under pressure with water, Buckeye Silicamix more readily adheres to the cupola walls, keeping costly "drop" to a minimum.

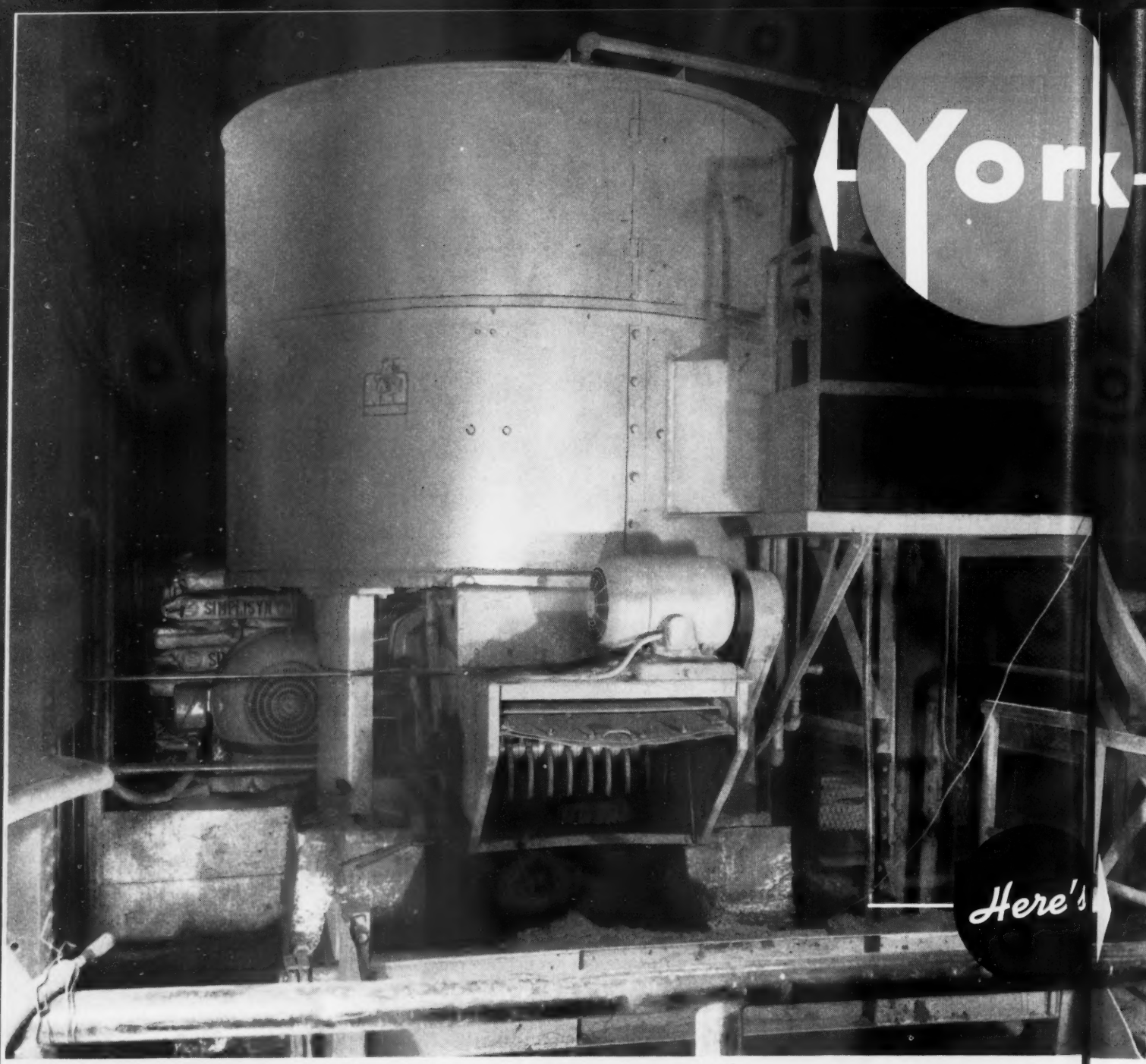
CHECK THESE FEATURES!

- Silicamix is scientifically controlled for uniformity.
- The pelletized nature of Silicamix makes for a free-flowing, easily controlled material.
- Silicamix assures less burn-out after application . . . it stands up under extra hours of heat.
- Each pellet of Silicamix carries its own bonding material . . . only one of its type on the market.
- Silicamix has been thoroughly tested in cupolas ranging from medium tonnage, high alloy irons to high tonnage, long-heat, straight grey irons.
- Silicamix is shipped in bulk or in 100 lb. bags as desired. When bagged, it may be palletized for quick and easy handling.

TRY SILICAMIX

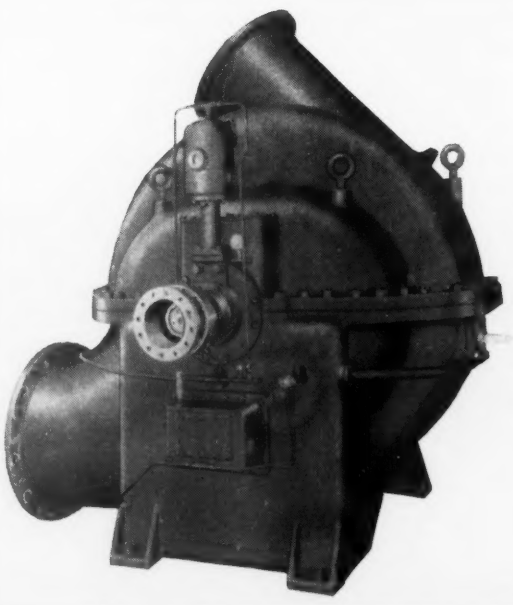
Try Silicamix on your next cupola lining job. A Buckeye refractory engineer will gladly bring a sample of Silicamix for your inspection and trial. No obligation. Enjoy the super-efficiency, economy, and extra heats which only Silicamix provides. Check its faster "buckshot" action.

SILICA CHEMICALS, INC.
AMHERST, OHIO



● LEFT—At York, shakeout sand is stored in slinger tank (left) and fed to preparing unit (right) via shakeout and magnetic belt. NATIONAL engineered shakeout arrangement is unique and effective in breaking hard baked floor sand lumps.

● RIGHT—Typical York Turbo-compressor unit. Widely used in shipboard and industrial air conditioning applications, these units are largely castings . . . require special mold and sand characteristics and a *rugged* 3F Mix-Muller for special Dorchester gravel sands.



depends on SIMPSON MIX-MULLER

for tough gravel sand preparing job

A well known and respected name in the manufacture of commercial and residential air conditioning equipment, York Corporation of York, Penna. are also "heavy" in shipboard and industrial air conditioning equipment . . . and "heavy" is the word for some of their floor molding work. (See chart at right.) One typical valve body core uses 15 cu. ft. of sand and measures 36"x60"x60".

Though a Simpson user for over 23 years, York Corporation uses many types of sand preparing equipment in their extensive foundry operations . . . but the *tough* jobs, where high quality is vital and ruggedness a prerequisite, are assigned to the Simpson Mix-Muller.

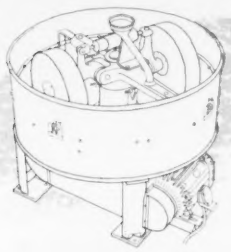
The No. 3F Mix-Muller shown at left has been turning out a top quality job on tough Dorchester gravel sand for York's floor molding work for over a year now . . . the repairs to date?—4 plows. A mixer previously used on this same sand went through two plows every *two days!*

There's a reason why York Corporation, as well as other leading foundries everywhere, look to Simpson for *performance* in critical mixing jobs. Mixing is our *business* at National—our *principal* business since 1914. Read how these years of experience are "built in" to the new F Series Mix-Muller . . . then write for Bulletin 511.

YORK CORPORATION SAND CHARACTERISTICS (Floor Molding

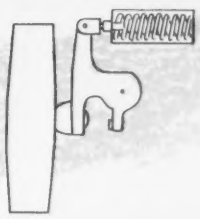
	DRY SAND FACING	FACING SAND
Average Baked Shear	40	55
Average Permeability	60	—
Average Green Compression	10.4	11.9
Average Moisture	5.5	6.5
Average Flowability	7.1	6.6
Average Volatiles	4.5	7.2

HOW THE *NEW* SIMPSON MIX-MULLER CAN GIVE YOU MORE FOR EVERY MULLING DOLLAR



SIMPLE, RUGGED, DEPENDABLE

Available in batch capacities of from 25 to 4000 lbs., new F Series Mix-Muller is simple in design and operation and relies on proven, efficient and economical stationary pan principle. All power is used to *mix* . . . none wasted in moving *sand*. Automatic, bottom discharge is quick, dependable.

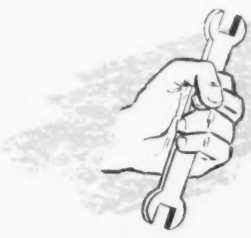


SPRING-LOADED MULLERS

Positive control over varying sand characteristics is possible with unique, easily adjusted spring tension method of applying infinitely variable muller pressures. New plow design and muller suspension arrangement helps to break up agglomerate grains quickly . . . a fluffy sand of high flowability results.

LOW MAINTENANCE

Centralized lubrication, anti-friction bearings and new, easy access door through crib are only a few of the many features that add up to long life, easy maintenance for the new F Series Mix-Muller.



National Engineering Company
(Not Inc.)
646 Machinery Hall Bldg. • Chicago 6, Illinois

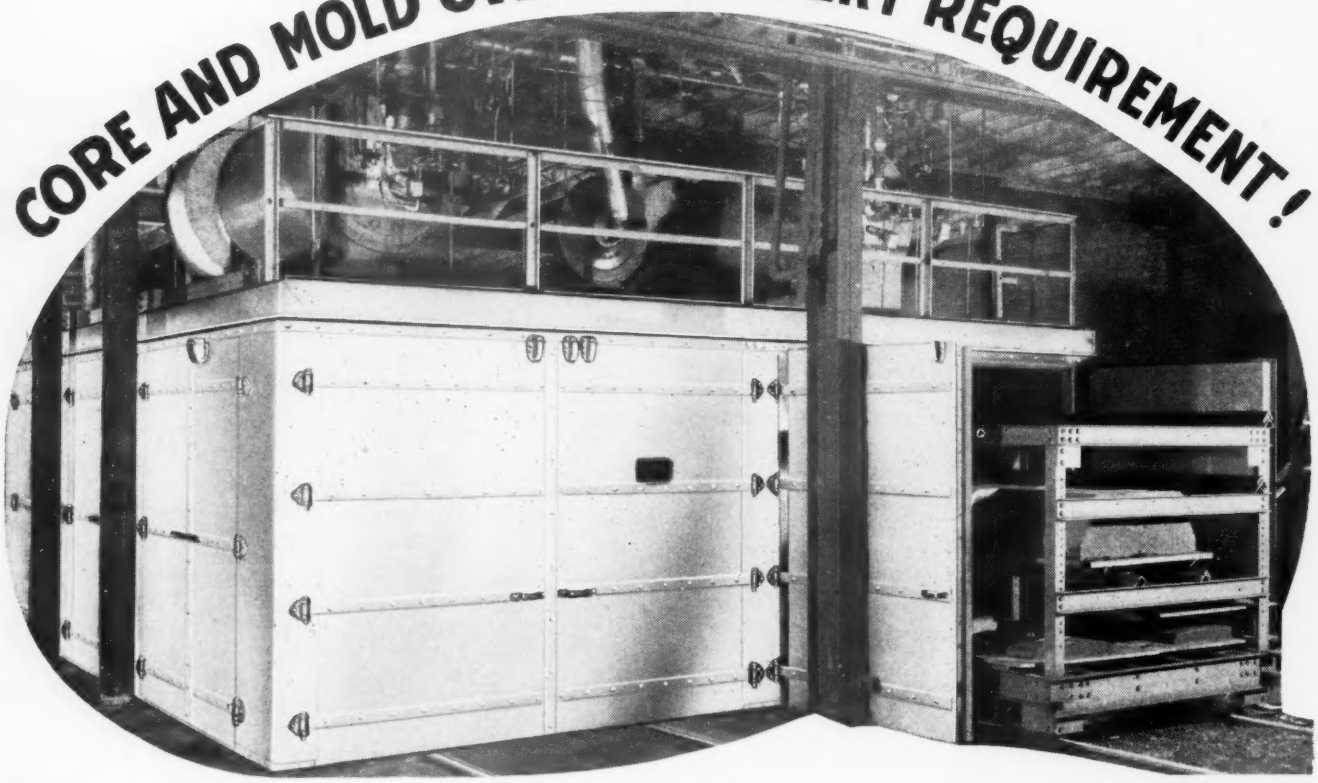
PRODUCTS OF THE PRACTICAL FOUNDRYMAN

SIMPSON *Intensive* MIX-MULLERS

CARL-MAYER

Foundry Ovens are versatile!

CORE AND MOLD OVENS FOR EVERY REQUIREMENT!



Typical List of CM customers:

Aluminum Co. of America
American Brake Shoe Co.
American Radiator Co.
Blaw-Knox Co.
Brown Industries
Buick Motor Div. of General Motors Corp.
Bucyrus-Erie Co.
Cadillac Motor Div. of General Motors Corp.
Columbia Steel Corp. (U. S. Steel Corp.)
Crucible Steel Castings Co.
Dunkirk Radiator Co.
Eclipse Aviation Division of Bendix Aviation Corp.
Electric Autolite Co.
Ford Motor Co.
Fremont Foundry Co.
G. & C. Foundry Co.
General Electric Co.
General Motors Corp. and Subsidiaries
Gilbert & Barker Co.
General Steel Castings Co.
Golden Foundry Co., Inc.
Henry Kaiser Corp.
W. O. Larson Foundry Co.
Mesta Machine Co.
F. E. Meyers & Bro. Co.
Oil Well Supply Co. (U. S. Steel Corp.)
Packard Motor Car Co.
Pittsburgh Steel Foundry Corp.
H. B. Salter Co.
Shenango Penn Mold Co.
Standard Foundry Co.
Union Brass & Metal Mfg. Co.
Union Steel Castings Co.
West Michigan Steel Castings Co.
A. C. Williams Co.
Whiten Machine Works
Whiting Corp.

CARL - MAYER TWO-COMPARTMENT CAR TYPE OVEN FOR CORES AND MOLDS. Each oven, 12′ wide, 26′ deep, 9′ high. One oven is used for baking large cores at night and has doors on side, permitting its use as a rack type oven during the day. Other oven is for night baking. Both compartments are individually heated by a Carl-Mayer recirculating type gas-oil heater enabling use of either gas or oil.

If you are quality conscious, it will pay you to consult with Carl - Mayer engineers. Write for Bulletin No.53-CM.

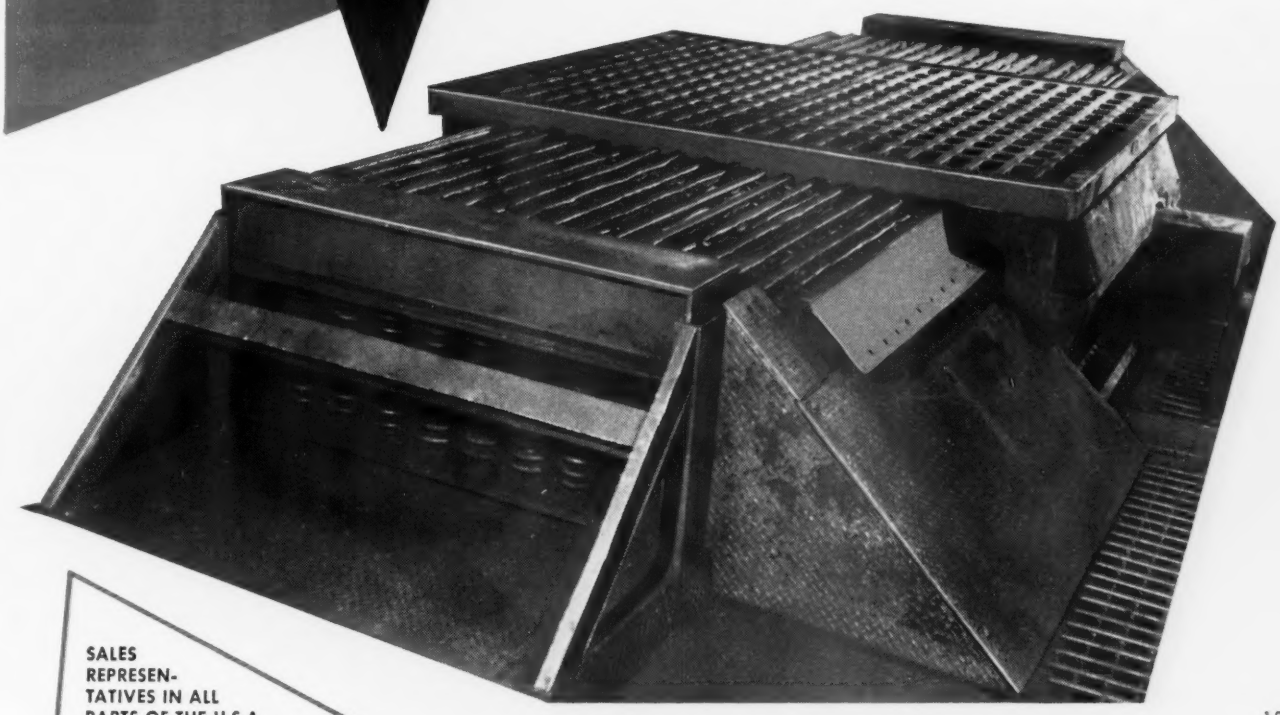
CORE OVENS, MOLD OVENS --all types

THE CARL-MAYER CORPORATION
3030 Euclid Ave., CLEVELAND, OHIO

Backed by Over 30 Years' Experience

Simplicity spring mounted shake-outs handle big flasks with ease at Beloit Foundry Company in Wisconsin

Installed at the Beloit Foundry Company, Beloit, Wisconsin, this Simplicity Shake-Out arrangement can handle big flasks ranging up to 75 tons regardless of the length or shape of the castings being shaken out. The center of the installation is a Simplicity 10′ x 12′ spring mounted shake-out which is one of the biggest single units in operation today. Prior to the installation of this shake-out, a Simplicity 8′ x 10′ Dual was used. By splitting the Dual and installing the new model between them, Beloit Foundry was able to get 200 sq. feet of useable shake-out surface. A combination of Positive Vertical Action with controlled throw, rugged body construction, and a massive 6′ Ductile Iron (nodular iron) deck which was cast by the Beloit Foundry Company, makes shake-out speedy and thorough without the danger of castings feeding off or bouncing off the deck. For handling heavy concentrated loads ranging up to 200 tons maximum, the Simplicity Spring Mounted Shake-Out is unequaled. If you're pouring really big castings it will pay you to call in your Simplicity sales engineer and let him give you all the facts on Simplicity Shake-Outs and other foundry equipment.



SALES REPRESENTATIVES IN ALL PARTS OF THE U.S.A. **FOR CANADA**: Canadian Bridge Engineering Company, Ltd., Walkerville, Ontario. **FOR EXPORT**: Brown and Sites, 50 Church Street, N. Y. 7, N. Y.

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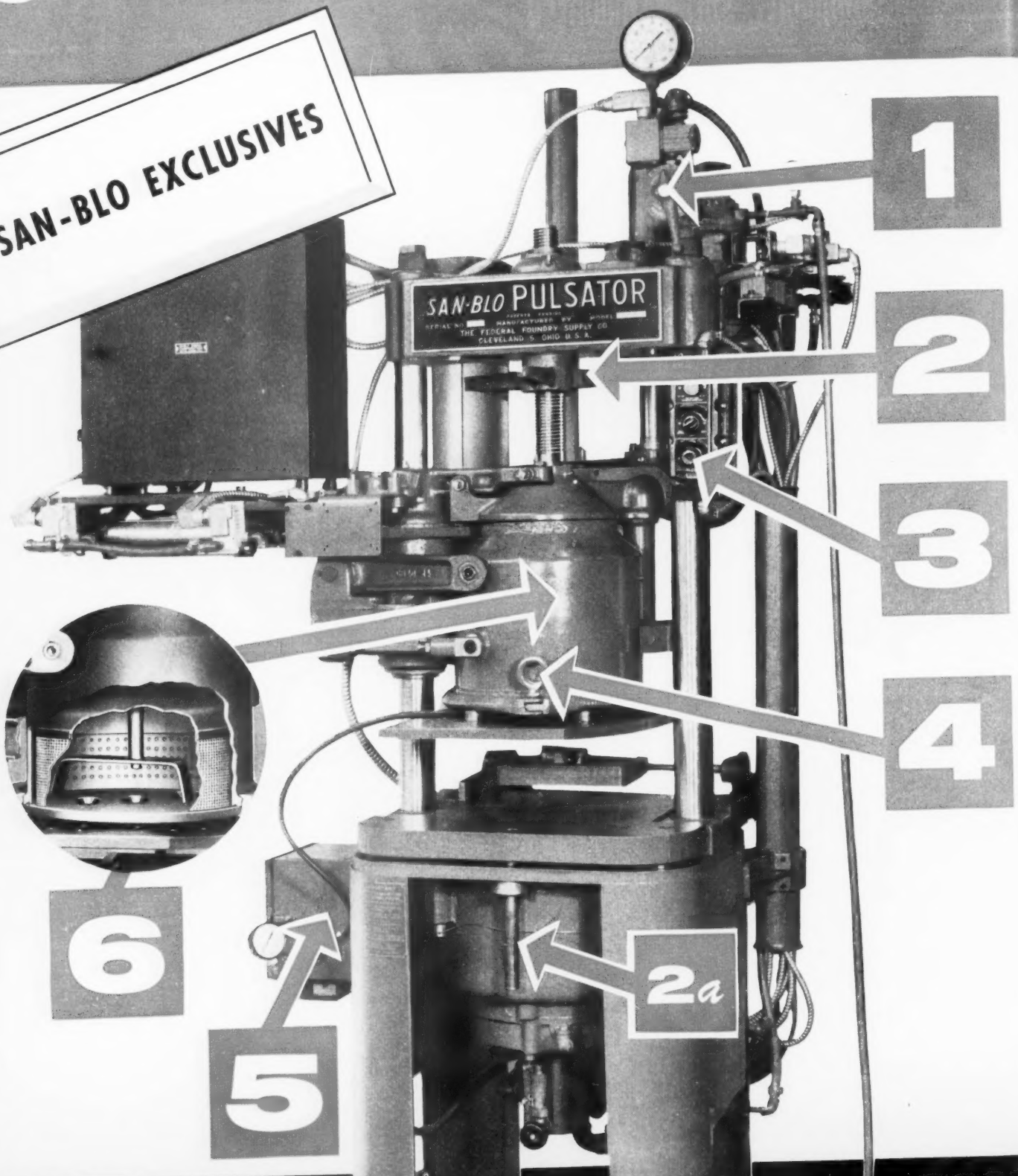
Simplicity
TRADE MARK REGISTERED

ENGINEERING COMPANY • DURAND, MICHIGAN

SAN-BLO core blowers

SAN-BLO EXCLUSIVES



SAN-BLO

MODEL 40-P8-LPP

WITH PULSATOR TYPE BLOW AND LOW PRESSURE PREFILL — FOR BLOWING CORES WEIGHING UP TO 40 LBS. EACH

$ $ more for your money ! ! !

1 LOW PRESSURE PREFILL—Timer and air valve arrangement by means of which *low air pressure* is used to "riddle" sand into the core box and *full blow pressure* automatically cut in for ramming the core. Minimizes core box wear opposite blow holes—permits blowing wooden core boxes never blown before.

Optional on all models

2 ADJUSTABLE SAND CHAMBER—Sand chamber is easily raised or lowered to accommodate various height core boxes—eliminating "stooling" or expensive machine modifications. Each core box can be run with a minimum draw stroke and at maximum production speed. (Air-oil controlled draw mechanism shown in photo at "2a".)

Standard on all models

3 SINGLE PUSH BUTTON CONTROL—All SAN-BLO models have single push button control for automatic clamping, blowing and drawing operations. Timers and counters may be incorporated in the automatic cycle, as optional equipment, to further speed up refilling and blowing cycle.

Single control standard on all models.

4 QUICK-CHANGE BLOW PLATE—For closed core boxes, blow plate can be changed by removing clevis pin and clamp ring—no tools required!

Standard on all models

For open-top boxes, a quick-change, universal blow and vent plate assembly (not shown) provides for making up inexpensive blow plates in less than 10 minutes time, and changing them on the machine in a matter of seconds.

5 PULSATOR TYPE BLOW—For blowing wooden core boxes, an air valve and control arrangement converts machine from continuous blow to a series of short blows, preventing full pressure build-up within the core box, at any one instant. Selector switch at push button station provides choice of continuous or pulsator type blow, on the same machine.

Standard on all "Pulsator" models

6 "CYCLO-AIR" SAND CHAMBER—Motor-driven agitator and aerating air circuit combine to "feed" sand to blow holes and eliminate "piping". Permits blowing *any* core sand mixture—delivery of 80% of each sand load to core boxes—blowing large and small cores with the same sand chamber and with equal efficiency—using fewer blow holes and vents.

Standard on all models

SAN-BLO GIVES YOU MORE MODERN IMPROVEMENTS . . . MORE FLEXIBILITY THAN ANY OTHER CORE BLOWER . . . GREATER CORE PRODUCTION, BETTER CORES AND LOWER CORE ROOM COSTS!

Never buy a core blower without first considering what you're going to get for your money! Make a list of the features you need in a core blower, for *your* core room. Get as many quotations as you wish. Then—compare item for item against your requirements, to see whether the features are available—and whether they're *standard equipment* or *extra!* You'll find that more of the features you want are standard on the SAN-BLO—extra on other core blowers. And, you'll find that the SAN-BLO incorporates *all* the modern core blowing improvements—many of which just aren't available on other machines. Take time to check every feature—you'll get more value for your core blowing dollar—and you'll get a SAN-BLO!

✦ ✦ ✦

SAN-BLO core blowing machines are available for blowing cores weighing from a few ounces to 250 lbs. each. For complete information and prices, please write our home office.

FEDERAL

San-Blo Division

The FEDERAL FOUNDRY SUPPLY Company

4600 EAST 71st STREET, CLEVELAND 5, OHIO

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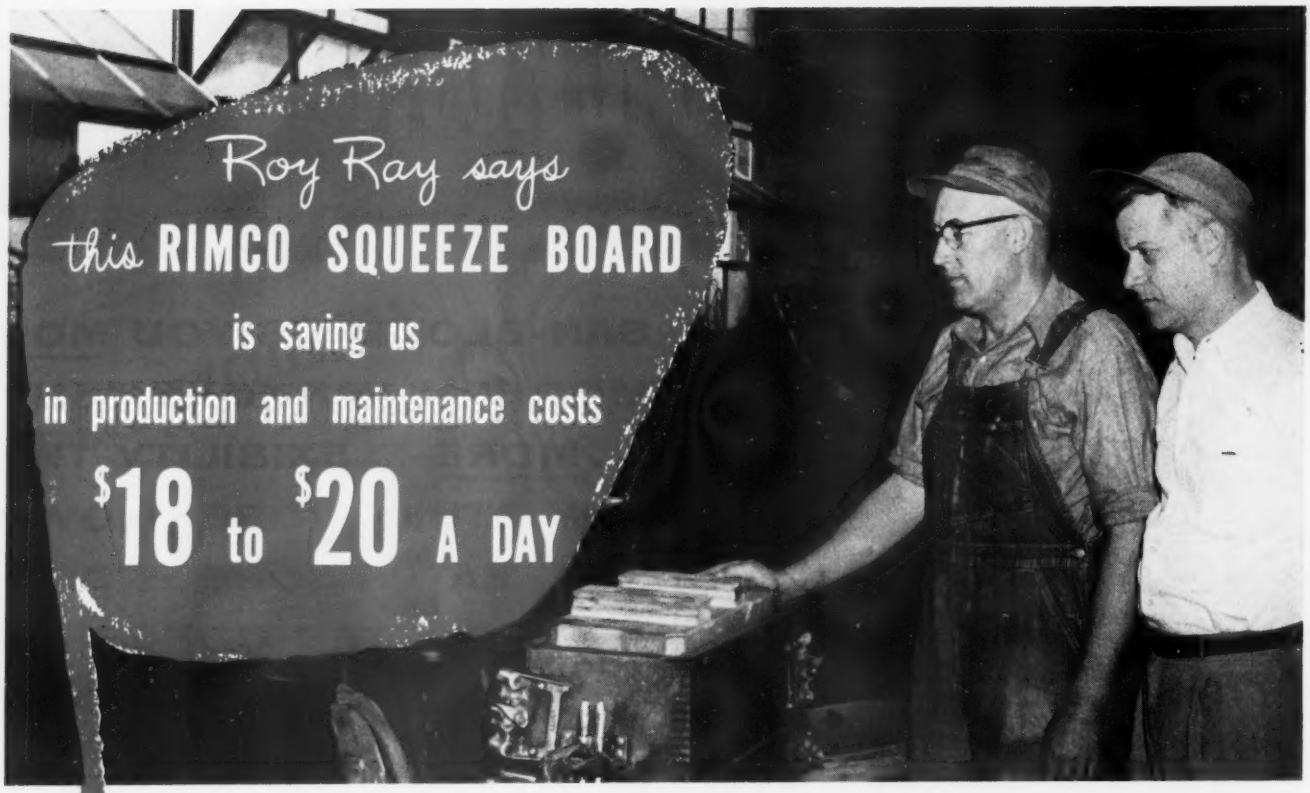
FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

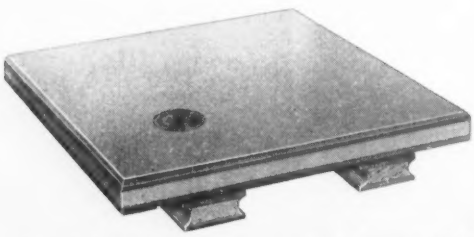


PHILCO CORP. DEXTER FOUNDRY DIVISION FAIRFIELD DISCOVERS RIMCO

Foundry Superintendent Roy Ray (above right) checks with Dale Lyons, Molding Foreman Assistant, on the many advantages of the RIMCO Squeeze Board. They give us seven basic reasons for their switch to RIMCO:

1. Save 3 to 4 seconds per mold because smooth surface means faster handling.
2. No deflection.
3. Lasting up to eight times longer.
4. Lower Maintenance Cost.
5. Less loose sand.
6. Lower scrap percentage.
7. More uniform squeeze.

You'll agree that any one of the seven is reason enough to choose RIMCO.



Free Sample

Send for a free sample of this money-saving RIMCO Squeeze Board. Examine the polished Resinwood faces. Figure up what you could save in your own plant. Write us for further information, or . . .

ask any representative of

THE FEDERAL FOUNDRY SUPPLY CO.

Cleveland — Crown Hill, W. Va. — Chicago — Detroit — Milwaukee — Richmond, Va. — St. Louis — Chattanooga — New York — Upton, Wyoming

QUALITY Since RIMCO 1868 MILLWORK

ROCK ISLAND MILLWORK COMPANY

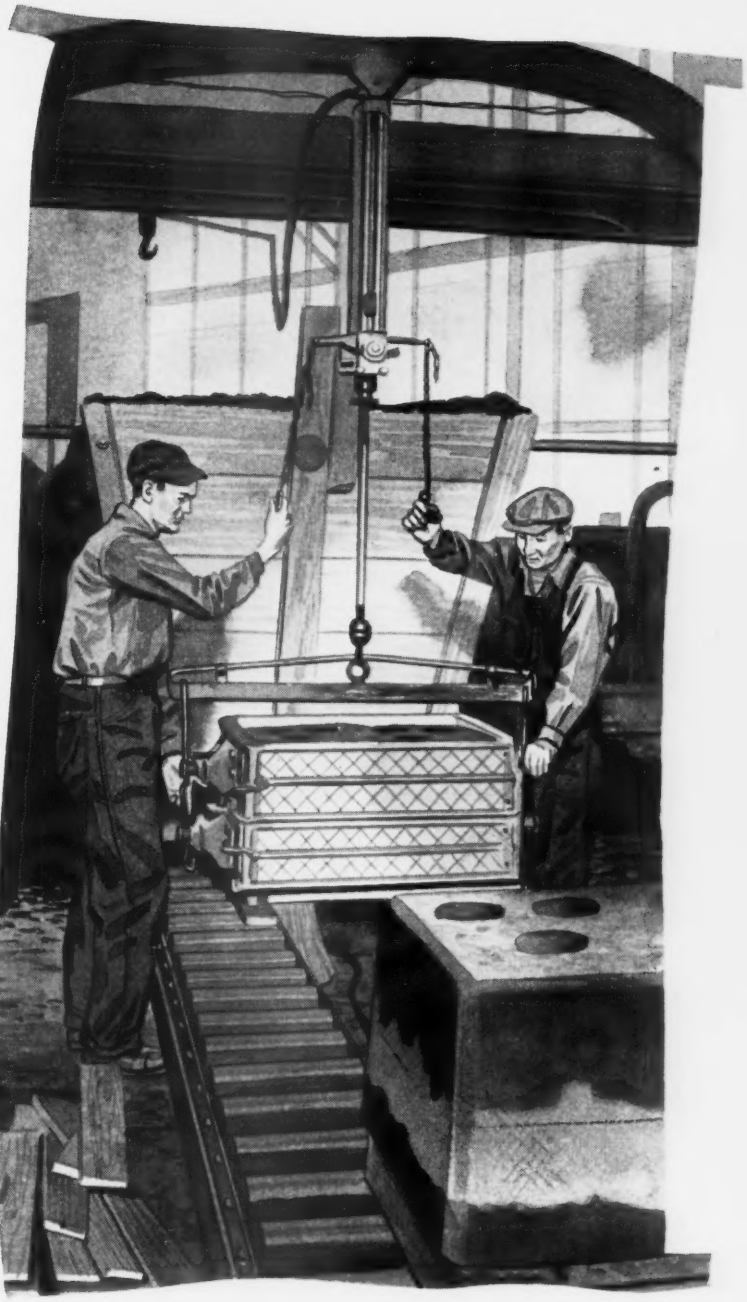
RESINWOOD DIVISION

Rock Island Illinois

..be sure with a

NATIONAL BENTONITE

bond!



Baroid

A dependable National Bentonite bonded mold means better production, better castings, less time in the cleaning room. Many experienced foundrymen have relied on National Bentonite for years because of consistently uniform high quality . . . good green strength . . . high hot strength . . . high sintering point . . . good mold durability . . . and because it requires the least water to temper correctly. You, too, can be sure of better bonds with NATIONAL BENTONITE. Quick service from better foundry suppliers everywhere.

Baroid Sales Division ☆ National Lead Company

Bentonite Sales Office: Railway Exchange Building, Chicago 4, Illinois

4721

(Advertisement)

What it takes to make a 3000 Degree Refractory Concrete

Because of the widespread interest in the use of refractory castables, many furnace operators have asked us for the story behind the performance of B&W's unique refractory concrete, Kaocast.

Here are the answers to some of the most frequently asked questions:

Q. *When you refer to Kaocast as a 3000 degree refractory castable, do you mean that its melting point is 3000° F?*

A. No, this means that its service use limit is 3000° F; its melting point is 200 degrees higher.

Q. *Just what does it take to make a 3000 degree refractory castable like B&W Kaocast?*

A. Let's first define a few terms. Refractory castables are made with granular materials which are volume stable at high temperatures and which can undergo repeated heating and cooling cycles without disintegration. These materials, known as refractory calcines or grogs, are blended with suitable hydraulic binders. The initial strength of a refractory castable is thus developed in the same manner as that of ordinary concrete—that is, through the chemical action between water and the binder. A strong *ceramic bond* is formed when the refractory castable is subjected to temperatures above the vitrification point.

Q. *Then you have a grog, a binder and a method of putting them together. Which is most important?*

A. You can't say that any *one* is most important. It's a combination of all three. Let's take them one at a time. Our grog consists primarily of the proper blend of kaolin and other alumina-silica materials. This ratio enables us to achieve a grog with minimum expansion and shrinkage, a high fusion point, and greater stability under load, at varying temperatures.

Q. *And now, what about the binder?*

A. There are a number of factors responsible for the success of the Kaocast binder. One is the compound Tricalcium Penta-aluminate (3 lime to 5 alumina). This formula produces the most refractory compound (highest melting point) that can be made from lime and alumina. Another is that by using the purest commercially available lime and alumina, the Kaocast binder is substantially free of iron and silica. Such traces of these that are present combine during the prefiring of the binder to produce stable compounds.

Q. *Just how important is the manufacturing or "blending" of the grog and the binder?*

A. If one factor could be singled out as "most important" it would be quality control.

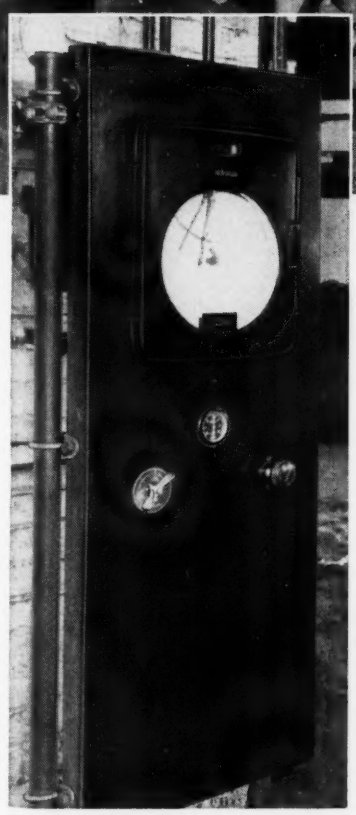
Direct control over the fineness of materials, prefiring temperatures, and other phases of manufacture is possible at B&W because both the grog and the binder are made and blended at B&W's Augusta Works—under B&W's direct control and supervision.

Q. *These factors you've discussed must add up to some specific advantages of Kaocast. What are they?*

A. B&W Kaocast has all the advantages of easy installation which are responsible for the widespread interest in refractory concretes, plus these exclusive features: It is the only 3000 degree refractory concrete with high resistance to spalling and low volume change throughout its operating range.

THE BABCOCK & WILCOX CO.
Refractories Division
General Offices:
161 East 42nd St., New York 17, N. Y.
Works: Augusta, Ga.

Another foundry proves that
it pays to "weigh" air!



At Parker-Street Foundry, Cleveland, Ohio, operator merely sets pointer on this Foxboro Air-Weight Controller (left) before start of run. Combustion is controlled automatically and continuously, pours are more uniform, and scrap losses are greatly reduced.

Another foundry has discovered the practical, automatic way to keep castings uniform . . . through Foxboro Air-Weight Control of cupola blast. An official of this mid-west foundry says: *"We can say that, after a year of operation, we find our melting much more uniform than before — even under adverse weather conditions. We get uniformly higher temperatures, regardless of day-to-day scrap variables."*

This is typical of reports from more than 1000 other foundries using Foxboro Air-Weight Control . . . product quality improved . . . rejects reduced . . . fuel saved . . . pigging practically eliminated. It's logical. In the Foxboro System a controller "weighs" air for cupola blast . . . compensates for atmospheric changes. Coke charge always gets correct amount of oxygen for best combustion . . . heating is faster, more uniform.

Investigate the advantages of Foxboro Air-Weight Control for *your* plant. Get in touch with a Foxboro Field Engineer, or write, for complete details.

FACTORIES IN THE UNITED STATES, CANADA, AND ENGLAND

FOXBORO
REG. U.S. PAT. OFF.

AIR-WEIGHT CONTROLLERS

THE FOXBORO COMPANY, 3211 NEPONSET AVE., FOXBORO, MASS., U. S. A.

One wash...many uses...

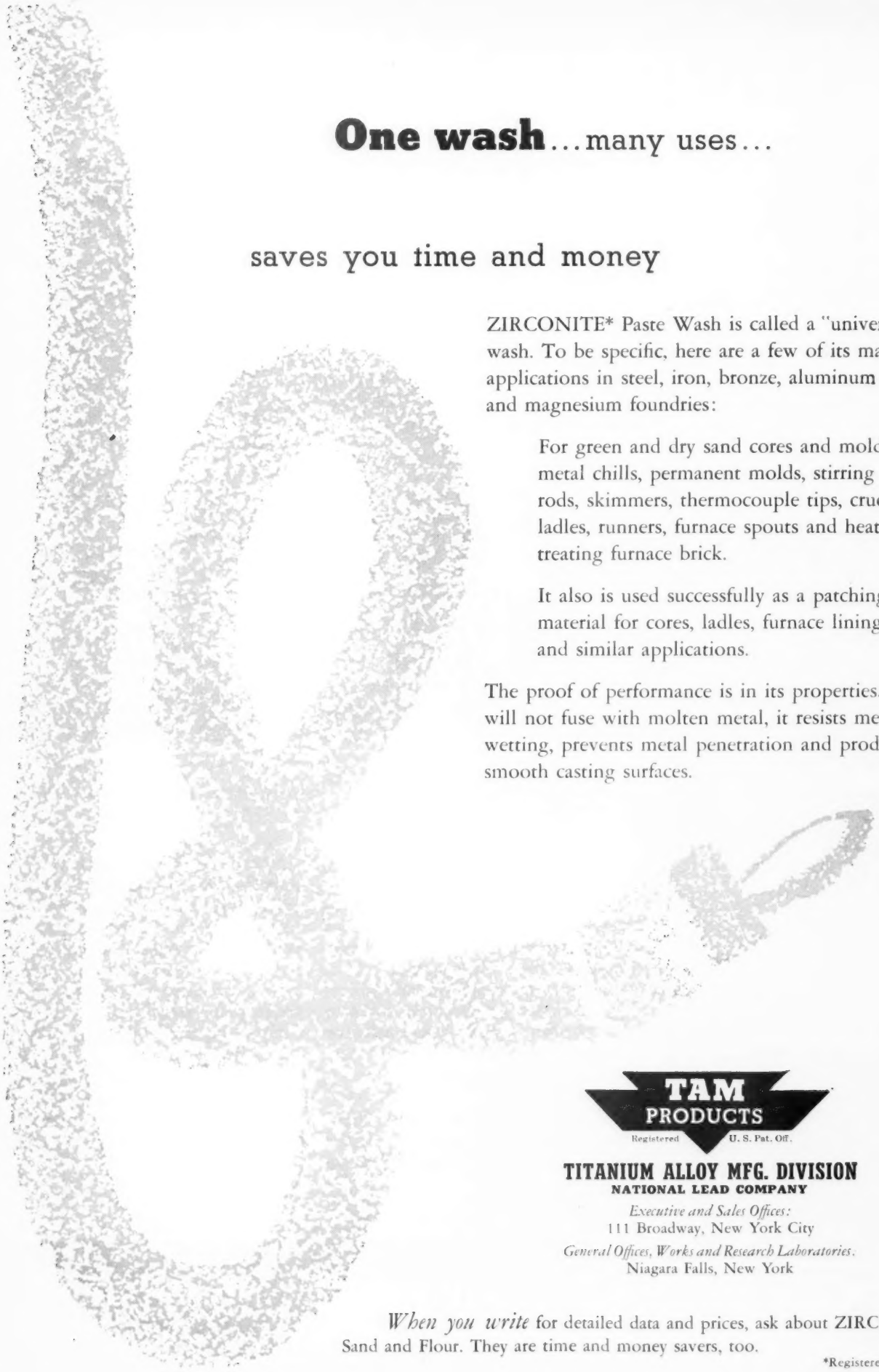
saves you time and money

ZIRCONITE* Paste Wash is called a "universal" wash. To be specific, here are a few of its many applications in steel, iron, bronze, aluminum and magnesium foundries:

For green and dry sand cores and molds, metal chills, permanent molds, stirring rods, skimmers, thermocouple tips, crucibles, ladles, runners, furnace spouts and heat treating furnace brick.

It also is used successfully as a patching material for cores, ladles, furnace linings, and similar applications.

The proof of performance is in its properties. It will not fuse with molten metal, it resists metal wetting, prevents metal penetration and produces smooth casting surfaces.



TAM PRODUCTS
Registered U. S. Pat. Off.

TITANIUM ALLOY MFG. DIVISION
NATIONAL LEAD COMPANY

Executive and Sales Offices:
111 Broadway, New York City

General Offices, Works and Research Laboratories:
Niagara Falls, New York

When you write for detailed data and prices, ask about ZIRCONITE* Sand and Flour. They are time and money savers, too.

*Registered trademark

"...completely sold on Pangborn Blastmaster® Barrel"

—says Bamber Foundry

That's exactly how foundryman Ronald Bamber, owner of Bamber Foundry, Stamford, Conn., feels about his Pangborn Blastmaster Barrel. He says, "We are getting 25% faster blast cleaning, which means 25% more production, and have eliminated the full-time labor costs of one man. Figuring everything, we estimate this new machine is operating for considerably less maintenance costs. The steel mesh door is wonderful, first really abrasive-tight door we've seen."

Mr. Bamber goes on to say the Blastmaster gives them excellent cleaning quality and is economical on abrasive. No wonder Bamber is sold on the Blastmaster.

You, too, will be sold on the Pangborn Blastmaster! For *cheaper* cleaning—for *faster, better* cleaning—investigate the Blastmaster Barrel, available in 1½, 3, 6, 12, 18 and 27 cu. ft. capacities. Write for Bulletin 223 now to: PANGBORN CORPORATION, 1400 Pangborn Blvd., Hagerstown, Md.

For better cleaning at lower cost, Pangborn recommends the use of Malleabrasive in your Blastmaster.

Pangborn

BLAST CLEANS CHEAPER

with the right equipment for every job

MEMBER FEMA

TOP: Model HAH "PAYLOADER" dumping its load of material into a conveyor.
BOTTOM: The same unit with Crane Hook carries barrels of metal pieces through doorways and narrow aisles.

Making DOLLARS
in small quarters . . .

Here's how to move materials profitably in cramped quarters. This Model HAH "PAYLOADER" tractor-shovel scoops up more than a ton of bulk materials at a time, carries it swiftly over smooth or rough ground and can dump it over bin or truck sides 8 feet high. Quickly-installed attachments like fork lift and crane hook also enable it to do many other material-handling jobs.

Short wheel base and rear-wheel power steer are what make it so maneuverable. Three-speed full-reversing transmission and torque converter drive insure precise, simple control and fast, profitable operation.

This "PAYLOADER" is one of a complete line of seven tractor-shovels with bucket capacities from 12 cu. ft. to 2 cu. yd. including rear-wheel and front-wheel drive models and big, powerful 4-wheel-drive types.

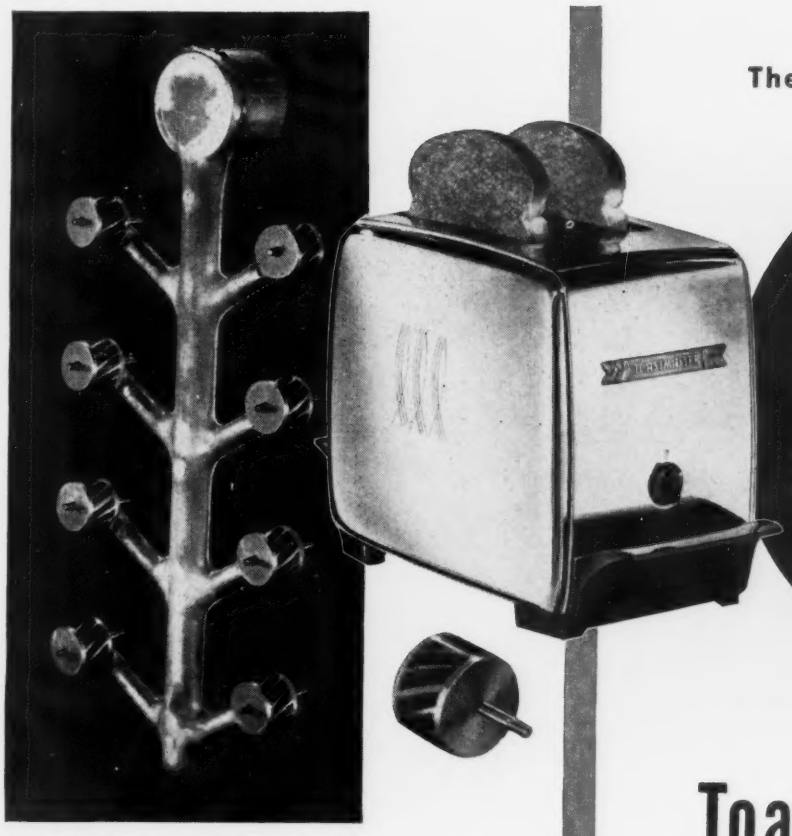
Every "PAYLOADER" is a proven machine with thousands in service — built by Hough, the pioneer and leader in tractor-shovel development — sold and serviced by 160 outstanding Distributors throughout the U.S.A. and Canada. Find out what a "PAYLOADER" can do for you. Your Distributor will be glad to demonstrate. The Frank G. Hough Co., 703 Sunnyside Ave., Libertyville, Ill.

JOB STUDIES
Are available with detailed performance of "PAYLOADER" tractor-shovels in a variety of industries. Write for copies — no obligation.

PAYLOADER®
THE FRANK G. HOUGH CO. · LIBERTYVILLE, ILL.
SUBSIDIARY—INTERNATIONAL HARVESTER COMPANY

The toaster you never need touch

depends on an electric motor ...so



Over 600 of these rotor gates are die cast each day, thus producing over 4800 of the finely detailed rotors shown above in two-thirds actual size.

Toastmaster chose KUX die casting machines

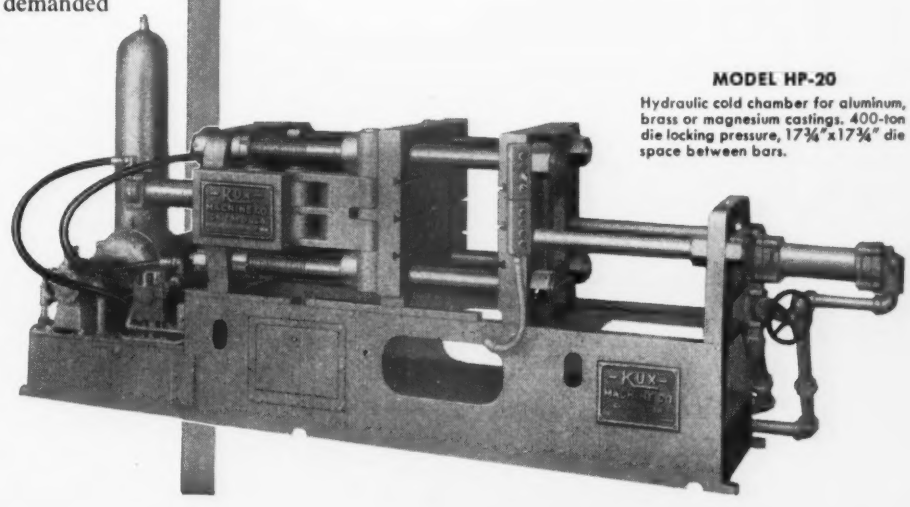
to make the heart of the motor...

a tiny aluminum rotor

The Toastmaster Products Division of McGraw Electric Company has a recipe for perfect toast with its new Super Deluxe Toaster. Merely place the bread in the toaster . . . it lowers the bread, starts it toasting and serves it up fast . . . all by itself!

It's an amazing automaton, thanks to the tiny aluminum die cast rotor that is the heart of the small powerful motor that serves as the elevator for the bread. A KUX Model HP-20 die casting machine was chosen to produce the rotors because of its long record of dependable service in turning out castings of fine detail and quality. As Toastmaster says, "the rotors meet the high standards demanded of every Toastmaster toaster part."

KUX produces a full range of modern die casting machines that require only the touch of a push button to put them automatically through a complete casting cycle that consistently turns out quality castings at high production speeds. Write for our detailed illustrated catalog.



MODEL HP-20

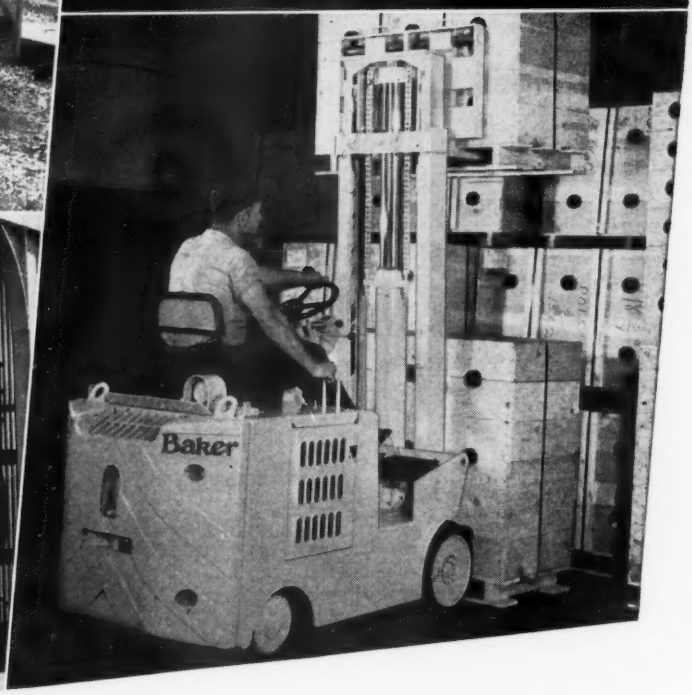
Hydraulic cold chamber for aluminum, brass or magnesium castings. 400-ton die locking pressure, 17¾"x17¾" die space between bars.

KUX MACHINE CO.

6725 Ridge Avenue, Chicago 26, Illinois

and Now—

BAKER TYPE FG STRAIGHT GAS



NOW— Baker has ALL THREE types of GAS FORK TRUCKS

● To its economy-priced, pneumatic-tired YARDLOADER and its premium GAS-O-MATIC line, Baker now adds the commercial version of its STRAIGHT-GAS fork truck—manufactured in quantity for the U. S. Armed Forces during the last two years. For ordinary fork truck applications this new Baker Type FG features low initial cost, low maintenance, speed and economy. It is built to the same high engineering standards that have characterized Baker electric trucks for over 35 years. Available in most wanted capacities.

If you need a fork truck for rugged outdoor-indoor handling—on rough floor or ground conditions—or where long hauls are involved, you can save up to $1,000 initial cost by buying the speedy Baker EY-40 "YARDLOADER"—pneumatic-tired, heavy-duty, gas-powered—the lowest priced fork truck in the 2-ton class.

Outstanding gas truck in the Baker line is the GAS-O-MATIC. The gas engine drives the exclusive GAS-O-MATIC generator to supply power to the Baker electric motor—giving electric truck performance and operating economy at premium gas truck initial cost. Gas consumption for normal service of 2-ton model about ½ gallons per hour. Capacities 4,000 to 6,000 pounds.

Descriptive bulletins are available. Write the Baker-Raulang Company, 1223 West 80th Street, Cleveland 2, Ohio.

Baker®
industrial trucks

Dear Reader:

This page has been provided for your convenience. Use one of the return cards attached for *more information* on advertisements in this issue.

FURTHER INFORMATION on any of the advertisements in this issue may be obtained by circling the page numbers of advertisements on one of the attached cards. Fill in your name and address, return your card to us—we'll forward your requests to the companies concerned. Further information on their advertisement will come direct to you from the advertiser. *Note: where more than one advertisement appears on a page, the following code is used for identification:* R (right); L (left); T (top); B (bottom); 1-2-3-4 (in order from top to bottom); IFC (inside front cover); IBC (inside back cover); OBC (outside back cover).

● For further information on helpful literature, trade publications, and new equipment descriptions, please refer to IDEAS FOR FOUNDRYMEN insert and return cards on page 239.

FOUNDRY Readers Service

FIRST CLASS
Permit No. 36
(Sec. 34.9 P.L.&R.)
Cleveland, Ohio

BUSINESS REPLY CARD
No Postage Stamp Necessary if Mailed in the United States

4c POSTAGE WILL BE PAID BY—

FOUNDRY
Penton Building
Cleveland 13, Ohio

Readers Service Dept.

NOVEMBER 1954

IFC	31	63	93	180-1	218	251	272B	284-4
1	32	64	94	183	219	253	273	285TL
2	35	65	95	184	220	254	274L	285BL
4-5	36	66	96	185	222-3	255	274R	285R
6	37	69	97	186	224	256T	275T	286L
7	38	70	98	187	225	256B	275B	286R1
8	39	71	99	188	226	257L	276T	286R2
9	40	72-73	100	190-1	227	257B	276B	286R4
10	41	74	143	192	228L	258	277T	287-1
11	42	75	145	194	228R	259	277B	287L2
12	43	76	147	195	229	262T	278T	287R2
13	44	77	149	196-7	231	262B	278B	287-4
14-15	45	78	151	198	232	263L	279	288T
16	46-47	79	152	199	233	263R	280L	288BL
17	48	80	154-5	200	234	264	280TR	288BR
18	49	81	157	201	235	265L	280BR	289TL
19	50	82	159	202	238	265R	281T	289BL
20	51	83	161	205	241	266L	281BL	289R
21	52-53	84	163	207	242	266R	281BR	290L
22	54	85	165	208	243	267T	282L	290TR
23	55	86	166	210-1	244	267B	282TR	291TL
24	56-57	87	168	212	245	268	282BR	291R
25	58	88	171	213	246	269	283R	300
26	59	89	173	214	247	270	284-1	303
27	60	90	175	215	248	271L	284-2	304
28	61	91	176	216	249	271R	284L3	IBC
29	62	92	179	217	250	272T	284R3	OBC
30								

THIS CARD VALID FOR USE IN UNITED STATES AND CANADA ONLY

PLEASE SEND further information on the advertisements appearing on the pages which are circled above.

NAME _____

TITLE _____

COMPANY _____

ADDRESS _____

CITY & STATE _____

This card MUST be completely filled out. Please TYPE or PRINT

NOVEMBER 1954

IFC	31	63	93	180-1	218	251	272B	284-4
1	32	64	94	183	219	253	273	285TL
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6	37	69	97	186	224	256T	275T	286L
7	38	70	98	187	225	256B	275B	286R1
8	39	71	99	188	226	257L	276T	286R2
9	40	72-73	100	190-1	227	257R	276B	286R4
10	41	74	143	192	228L	258	277T	287-1
11	42	75	145	194	228R	259	277B	287T2
12	43	76	147	195	229	262T	278T	287B2
13	44	77	149	196-7	231	262B	278B	287-4
14-15	45	78	151	198	232	263L	279	288T
16	46-47	79	152	199	233	263R	280L	288BL
17	48	80	154-5	200	234	264	280TR	288BR
18	49	81	157	201	236	265L	280BR	289TL
19	50	82	159	202	238	265R	281T	289BL
20	51	83	161	205	241	266L	281BL	289R
21	52-53	84	163	207	242	266R	281BR	290L
22	54	85	165	208	243	267T	282L	290TR
23	55	86	166	210-1	244	267B	282TR	291TL
24	56-57	87	168	212	245	268	282BR	291R
25	58	88	171	213	246	269	283R	300
26	59	89	173	214	247	270	284-1	303
27	60	90	175	215	248	271L	284-2	304
28	61	91	176	216	249	271R	284L3	IBC
29	62	92	179	217	250	272T	284R3	OBC
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FIRST CLASS
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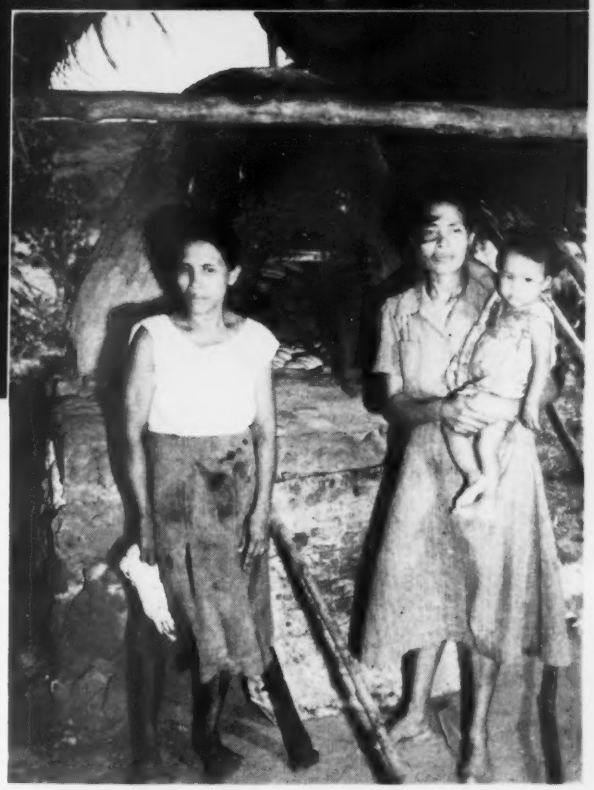
FOUNDRY Readers Service

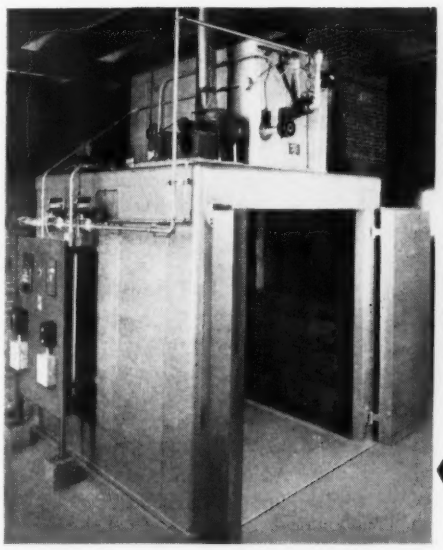
This **OLD MUD OVEN** still bakes ...but how efficiently?

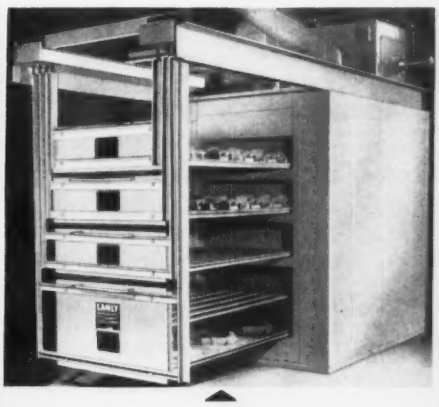
Despite the availability of modern kitchen stoves and ovens, travelers can still view the almost pathetic baking operations of old mud ovens.



...even **TODAY,** many Foundries are operating out-dated obsolete core ovens

Outdated, inefficient foundry ovens can drag on production and profit figures in much the same way as old mud ovens hamper volume output and quality on the bread producing line.





1. Drawer Type Oven

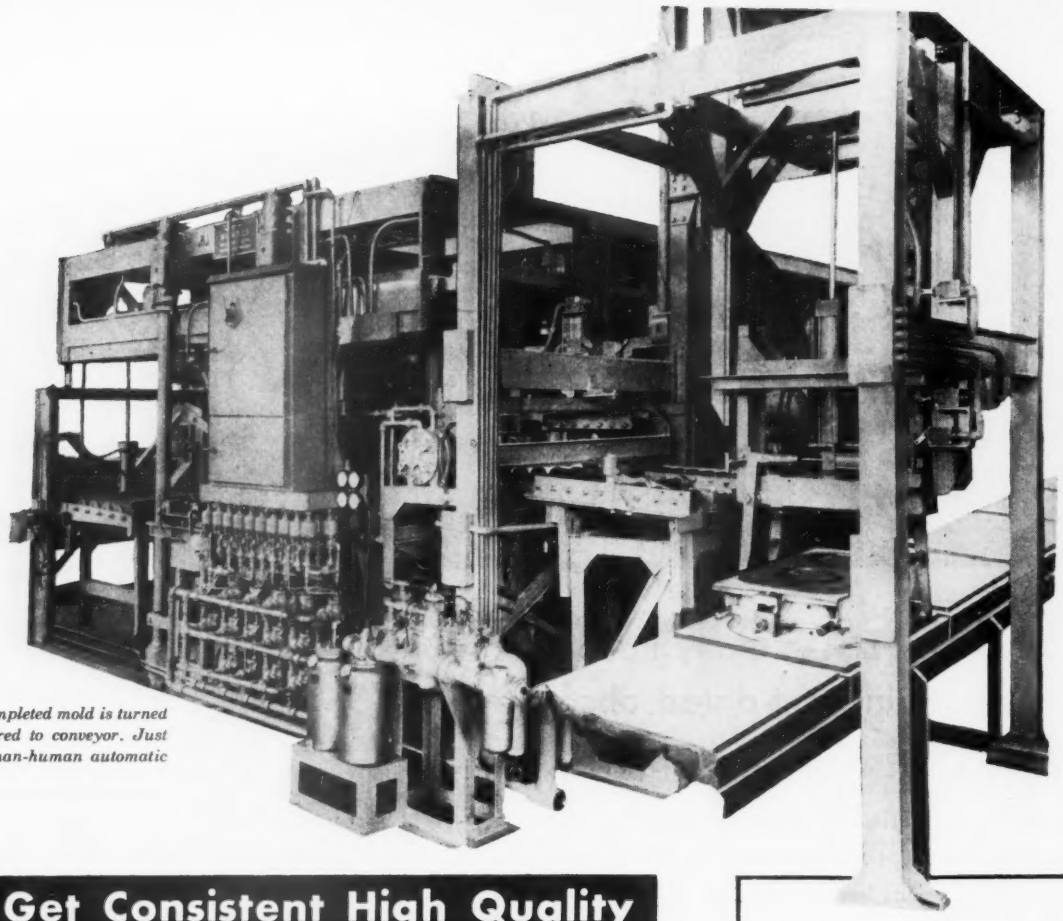
2. Single Compartment Rack Type Oven

3. Car Type Oven

Isn't this an opportune time to examine closely the oven facilities of your foundry for a possible improvement? The average foundry requirements can be met with standard LANLY units. Custom designed units for core baking, pasting and mold drying are part of LANLY'S services, as well as ovens for casting conditioning and heat treating.

WRITE FOR THE LATEST CATALOG AND FACTS ON ANY INSTALLATION

LANLY
FOUNDRY OVENS
THE LANLY COMPANY • 780 PROSPECT AVE
CLEVELAND, OHIO



Automatically, completed mold is turned over and transferred to conveyor. Just one of the better-than-human automatic operations.

You Get Consistent High Quality with Nicholls Fully-Automatic Push-Button Molding Machines

Get a continuous flow of molds—better molds. Eliminate money-squandering risk and error. Our new No. 24 Type C heavy-duty molding machine culminates almost 50 years of experience to give you better molds at a lower cost—automatically. And automatically, profits increase as costs of production and materials decline—thanks to Nicholls. Write us for details about Nicholls heavy duty molding machines.

Cost sheets too, are in better shape, when you mold on Nicholls machines.

Now Study These Cost-Cutting Advantages

- Pneumatic Pattern Draw.
- Air-Operated Car-Type Squeeze Head.
- Built-in Flask, Roll-in, Roll-out Device.
- Sand Hopper That Measures.
- Flask Feed-in Elevator.
- Flask Indexing Device.
- Sand Spill Upset.
- Mold Turnover and Transfer.

WM. H. NICHOLLS CO., INC., Richmond Hill 18, Long Island, N. Y.

NICHOLLS

Duplexing in this Lectromelt Furnace gives castings specified wear, heat and pressure resistance.

"Specials are routine . . . with our *Lectromelt** Furnace"

"Special irons for special castings are routine production in our plant," says one gray iron foundry plant engineer. "The electric furnace process is the only way to produce irons that will meet the tensile strength and machinability requirements that our customers need in special castings," his chief metallurgist added.

The furnace being talked about was a Lectromelt. And the results are typical of the precise control Lectromelt Furnaces make possible. Whether you're working with irons, semi-steels or alloy steels, a Lectromelt Furnace will give you precise control at costs often comparable to cupola melting . . . yet, with unmatched flexibility.

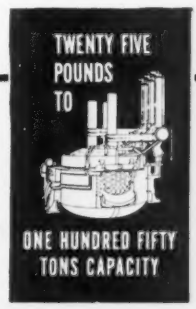
Laborsaving, top-charging Lectromelt Furnaces provide such control at low cost whether for melting, smelting, refining or reduction. Our engineers will gladly discuss means of cutting costs for these operations without cutting quality. Write, Pittsburgh Lectromelt Furnace Corporation, 314 32nd Street, Pittsburgh 30, Pa.

Manufactured in . . . ENGLAND: Birlec, Ltd., Birmingham . . . FRANCE: Stein et Roubaix, Paris . . . BELGIUM: S. A. Belge Stein et Roubaix, Bressoux-Liege . . . SPAIN: General Electrica Espanola, Bilbao . . . ITALY: Forni Stein, Genoa. JAPAN: Daido Steel Co., Ltd., Nagoya

*REG. T. M. U. S. PAT. OFF.

MOORE RAPID

WHEN YOU MELT... *Lectromelt*

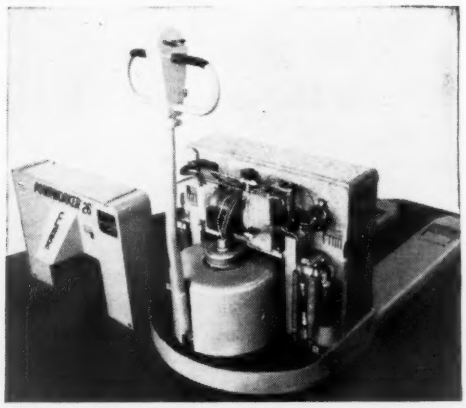


Make sure your

CLARK's

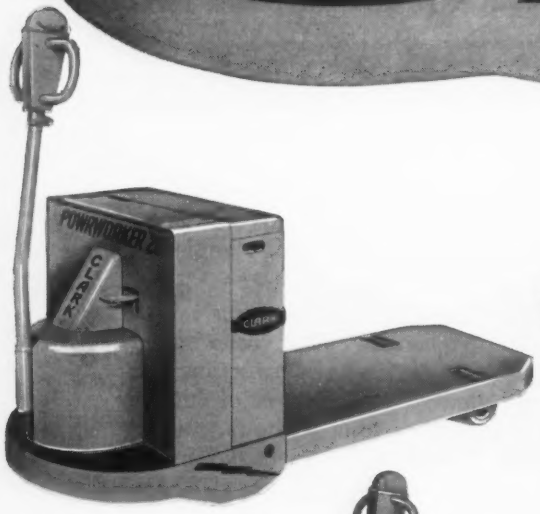
***POWRWORKER* "26" Pallet Truck**
4000 and 6000 lbs. capacity

. . . Ask him to



HYDRAULIC SYSTEM EXPOSED IN 2 MINUTES . . .

Remove 4 bolts and slip off the one-piece cover; the complete hydraulic sub-assembly is exposed. Hydraulic motor, pump, oil reservoir, valve assembly and self-aligning cylinders are immediately accessible and ample space is provided for quick inspection or removal.



***POWRWORKER* "26"**
Platform Truck
4000 and 6000 lbs. capacity

***POWRWORKER* Tilting Fork Stacker**
1500, 2000, 2500, and 3000 lbs. capacity

maintenance man sees this—

POWRWORKER "26"*

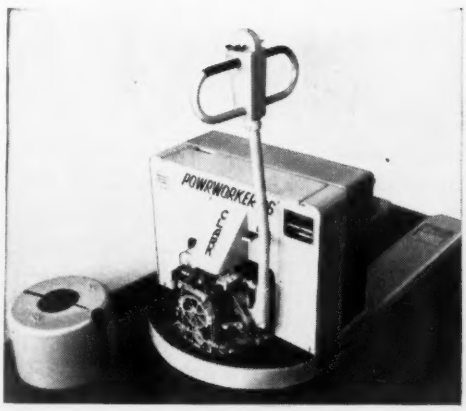
The most "SERVICEABLE" truck ever built!

Built for years of dependable service, the POWRWORKER is designed with the maintenance man in mind. No lubrication is necessary. Wheel bearings and drive motor bearings are sealed for life. Gear train, mounted on ball and roller bearings, operates in a totally enclosed bath of oil. Direct wiring between controls and motor eliminates the source of resistance. There are no commutators or long flexing wires, eliminating any chance of power loss and insuring maximum efficiency.

Every working part is completely and easily accessible. Either the hydraulic system or the power head can be uncovered separately, permitting service without further dis-assembly.

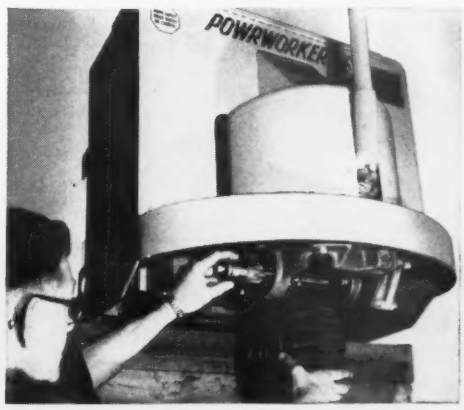
For all-round serviceability and operating efficiency, no truck on the market can match the POWRWORKER, the most compact and functional standard truck ever built. See your own local Clark dealer for further information or demonstration.

compare these ACCESSIBILITY features



POWER HEAD READY-TO-WORK-ON IN 2 MINUTES . . .

Split cover allows complete accessibility to the drive motor, brakes, resistor and control panel by merely removing 7 screws. Revolving head permits servicing any side of the power head without further dis-assembly. For major overhaul, the whole unit can be removed in 17 minutes.



CHANGE DRIVE TIRE IN 12 MINUTES . . .

Standard Press-on type demountable tire is furnished as original equipment. Raise the truck 12 inches and loosen spanner nut which releases the axle shaft and the wheel drops out. Split wheel rim with spreader inserts allow immediate tire dis-assembly and re-assembly.

SERVICE BONUS—POWER UNIT REMOVED IN 17 MINUTES . . .

For complete service or overhaul—when necessary—the complete power head, control handle and drive mechanism can be lifted out with a hoist after removing three bolts. Another Example that the POWRWORKER is designed with the maintenance man in mind.

*The POWRWORKER "26" is only 26 inches longer than the load . . . the shortest standard truck on the market!

☐ Please send POWRWORKER literature. ☐ Have representative call.

Name_____

Firm Name_____

Street_____

City_____ Zone ____ State_____

POWRWORKER SECTION
Industrial Truck Division
CLARK EQUIPMENT COMPANY
Battle Creek 16, Michigan

CLARK EQUIPMENT

YOU'LL DO A BETTER JOB

with **H. V. ADAMS DESIGNED**

HIGH EFFICIENCY FOUNDRY TOOLS

"UNIVERSAL FREE WHEELING"

FOUNDRY SAND RIDDLE

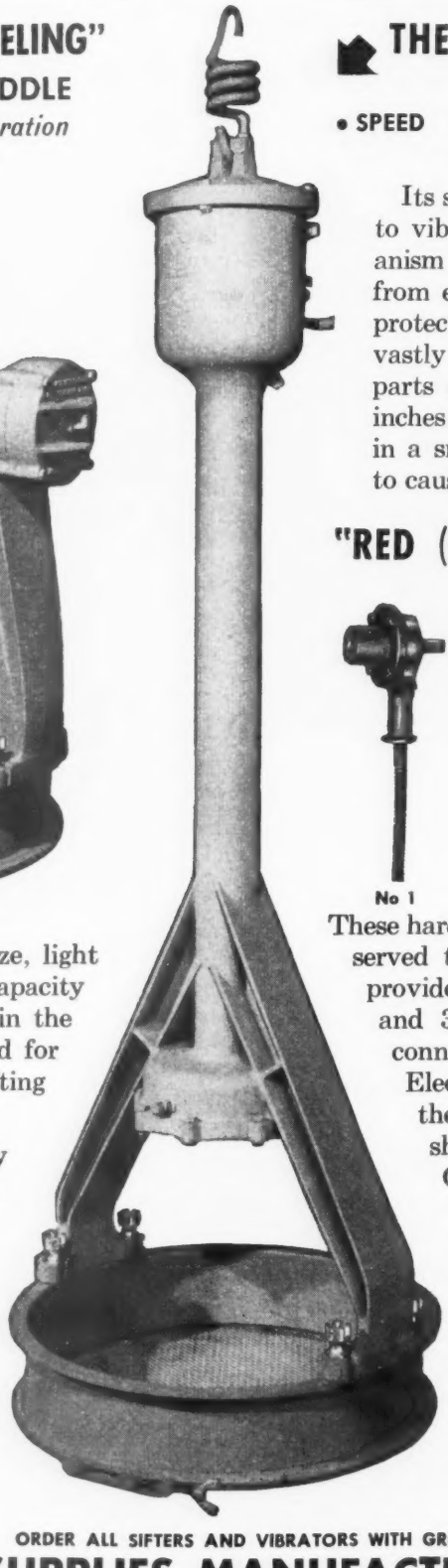
with the Double Eight Vibration

Because of its convenient size, light weight and good riddling capacity it long has been a favorite in the foundry. It also can be used for mixing core sand or for sifting sand directly into molds.

The mechanism is entirely enclosed protecting it from harmful dust and grit.

The main frame is cast in very strong tough aluminum.

It uses quick change ferruled sieves with 20 in. diameter sifting area. There are no loose wires to harm hands.



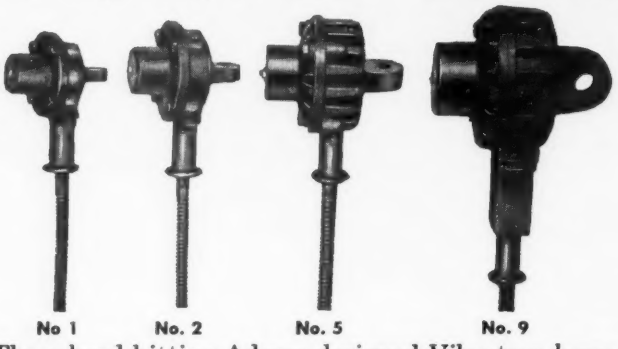
THE "ROTOPLANE" SPEED SIFTER

WILL GIVE YOU

- **SPEED**
- **ECONOMY**
- **SAFETY**
- **LONGER LIFE**
- **GREATER SIFTING CAPACITY**

Its sturdy one-piece frame and long shaft add to vibration effectiveness. The sealed-in mechanism assures protection of motor and bearings from exposure to dust and grit. This sealed in protection and "Rotoplane's" free-rotary action vastly increase bearing life. No exposed moving parts endanger the operator. Sieves have 20 inches diameter clear sifting area—are mounted in a smooth steel ferrule with no jagged edges to cause dangerous cuts and scratches.

"RED (Devil) ELECTRIC" VIBRATORS



No 1 No. 2 No. 5 No. 9

These hard hitting Adams designed Vibrators have served the foundries for over 30 years. They are provided with a 6 foot 3 wire authorized cable and 3 wire grounded connector which, when connected with our 3 wire grounded Red Electric Knee Switch, automatically grounds the vibrator protecting the worker from shock. The vibrators have passed the U. S. Government code inspection.

Other Foundry Products:

- **No. 11 NOISELESS TYPE VIBRATOR**
- **A-20 ELECTRIC VIBRATOR**
- **RED ELECTRIC KNEE SWITCHES**
- **"ROTO" ADJUSTABLE BIN VIBRATOR**
- **2 MIN. UNIVERSAL FINENESS TEST SIFTER.**
- **UNIVERSAL TRIPOD CARRIER**

ORDER ALL SIFTERS AND VIBRATORS WITH GROUND WIRE!!

FOUNDRY SUPPLIES MANUFACTURING CO., NOT INC.

2221 Orchard Street - Chicago 14, Illinois

Established 1918 **Cable Address: "Rotoplane Chicago"** **H. V. ADAMS, Mgr.**

Need help on molding practice?

CALL IN THE REPUBLIC PIG IRON METALLURGIST

His knowledge of foundry operations is based on years of actual foundry experience plus a thorough knowledge of all types of pig iron.

Hundreds of foundrymen regularly keep in touch with the Republic Pig Iron Metallurgist. They rely on him to help solve foundry problems or answer questions on molding practice.

Frequently he is called in to make an operational survey. His recommendations often result in improved foundry operation, increased production efficiency and unit output with no increase in overhead costs.

Republic, the only producer of a complete line of merchant pig irons, offers you this metallurgical service without cost or obligation.

Write, wire or phone us when you would like to have a Republic Pig Iron Metallurgist call at your plant.

REPUBLIC STEEL CORPORATION
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, New York

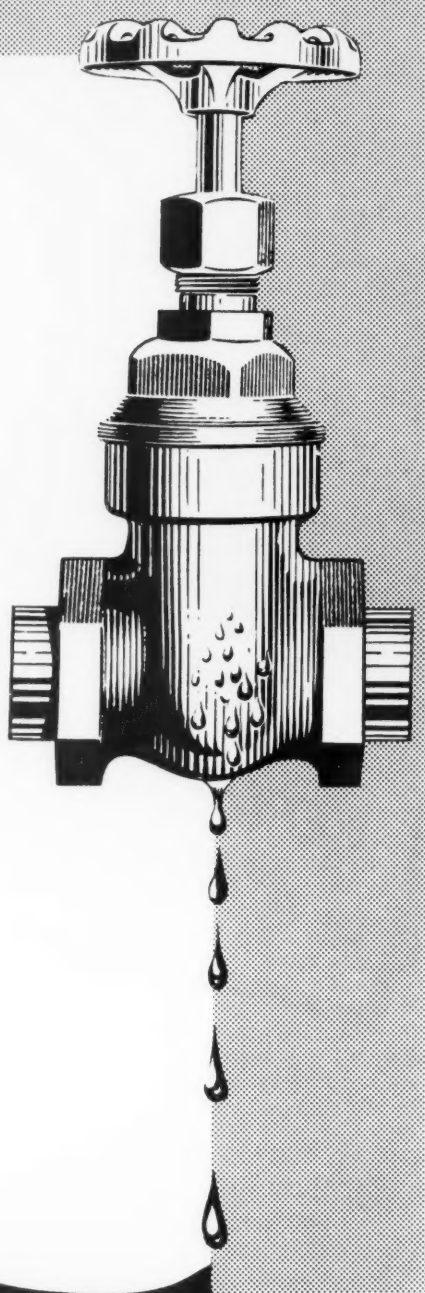
REPUBLIC PIG IRON

"CHATEAUGAY"	REPUBLIC (Northern)	REPUBLIC (Southern)
Low-Phosphorous, Copper-Free	Foundry, Bessemer Basic and Malleable	Foundry and Basic

REPUBLIC STEEL

THERE IS A SOLUTION TO YOUR NONFERROUS *Foundry Problems...*

Melt Quality



When you call upon
LAVIN'S ENGINEERING SERVICE

MANY LEAKY CASTINGS RESULT FROM IMPROPER MELTING PRACTICES

When all other factors are entirely satisfactory in the production of a casting, low melt quality, resulting from improperly operated furnaces will yield leakers.

The absorption of gas by molten metal exposed to an improper furnace atmosphere will cause intro-connected microporosity, which is frequently the cause of pressure failure.

Regardless of the type of melting equipment employed, proper operation and the maintenance of suitable atmosphere is essential to the production of the high melt quality necessary for pressure tight castings.

Lavin's metallurgical staff is always ready to assist the foundryman in finding the solution of any routine or special casting problem. Our chemical and research laboratories are available to you at no cost or obligation.

Next time call upon LAVIN'S engineering service

"The Foundryman's Problems Are Our Problems"

FREE: Write for your copy of the 20 page Lavingot technical Journal Vol. 10. No. 1 & 2 Containing, Specifications . . . test bar designs Nonferrous Ingot & Casting Alloys in chart form.

BRASS • ALUMINUM • BRONZE — ZINC BASE DIE • CASTING ALLOYS

RESEARCH — CONTROLLED REFINING
INSURE UNIFORM QUALITY

• REFINERS OF BRASS, BRONZE AND ALUMINUM • PRODUCERS OF ZINC BASE DIE CASTING ALLOYS • DEOXIDIZERS . . . DEGASIFIERS . . . FLUXES . . . SHOTS • CAST VIRGIN ELECTROLYTIC COPPER ANODES • TYPE METALS.

R. LAVIN & SONS, INC.

• OFFICES—Boston, Pittsburgh, Cincinnati, Minneapolis, Philadelphia, Cleveland and Detroit
• WAREHOUSES—Boston, Philadelphia, Pittsburgh, Cleveland, Detroit, Minneapolis and Houston

3426 S. KEDZIE AVENUE • CHICAGO 23, ILLINOIS
REPRESENTATIVES IN PRINCIPAL CITIES

R. LAVIN & SONS, INC. 1900 — 54 Years — 1954 — SERVING THE FOUNDRY INDUSTRY

can you match this Ability with any one machine?

Ability to dig The Allis-Chalmers HD-5G Tractor Shovel is not merely a loader. It is a powerful excavator. It can dig into clay, break up and load hard-packed bulk chemicals. Bucket teeth and rear-mounted hydraulic ripper attachments are available to speed tough excavating jobs.

Ability to load fast With its big 1¼-cu-yd bucket — and the power to crowd it full — the HD-5G keeps loading and stockpiling jobs moving at peak production. Two-yard light materials bucket is available for snow, coal, and other light materials.

Ability to maneuver—in close quarters. It takes a crawler tractor to utilize such power and capacity in such a small space. The HD-5G pivots around within its own track length. Special high-speed reverse adds further to output on short-cycle jobs.

Ability to handle any load A wide variety of front-end attachments may be quickly interchanged with the standard bucket. Included are Lift Fork for packaged and palletized loads, Bulldozer for stripping and stockpiling, Crane Hooks for machinery and other heavy, solid objects, special Rock Buckets and Rock Forks. Drawbar is always available for heavy hauling jobs.

Ability to work anywhere any time The HD-5G has stability to work safely over rutted or uneven ground . . . traction and flotation to travel through snow, mud, sand where rubber-tired equipment cannot operate. It is the ideal machine both for materials handling and yard maintenance jobs.

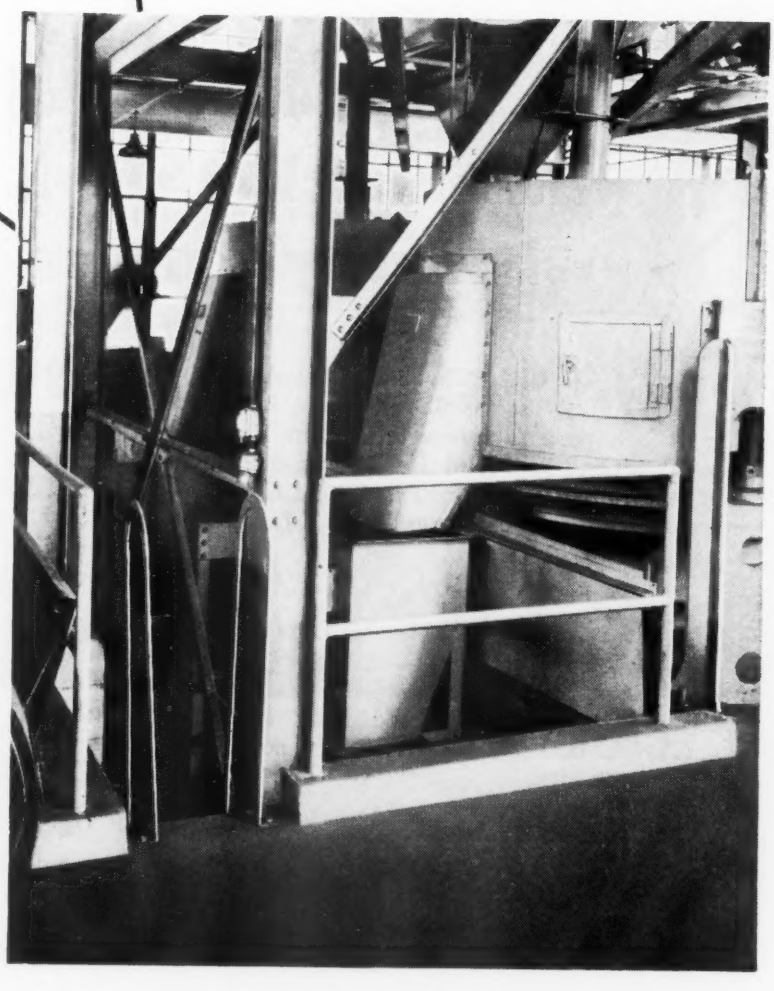
Write for literature or ask your Allis-Chalmers dealer to tell you more about the versatility and flexibility of the HD-5G. Let him show you how its ability to switch from job to job — and to do each one well —can save you time, labor and specialized equipment.

ALLIS-CHALMERS
TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

you can make SAND PREPARATION automatic

with a

CLEARFIELD MIXER



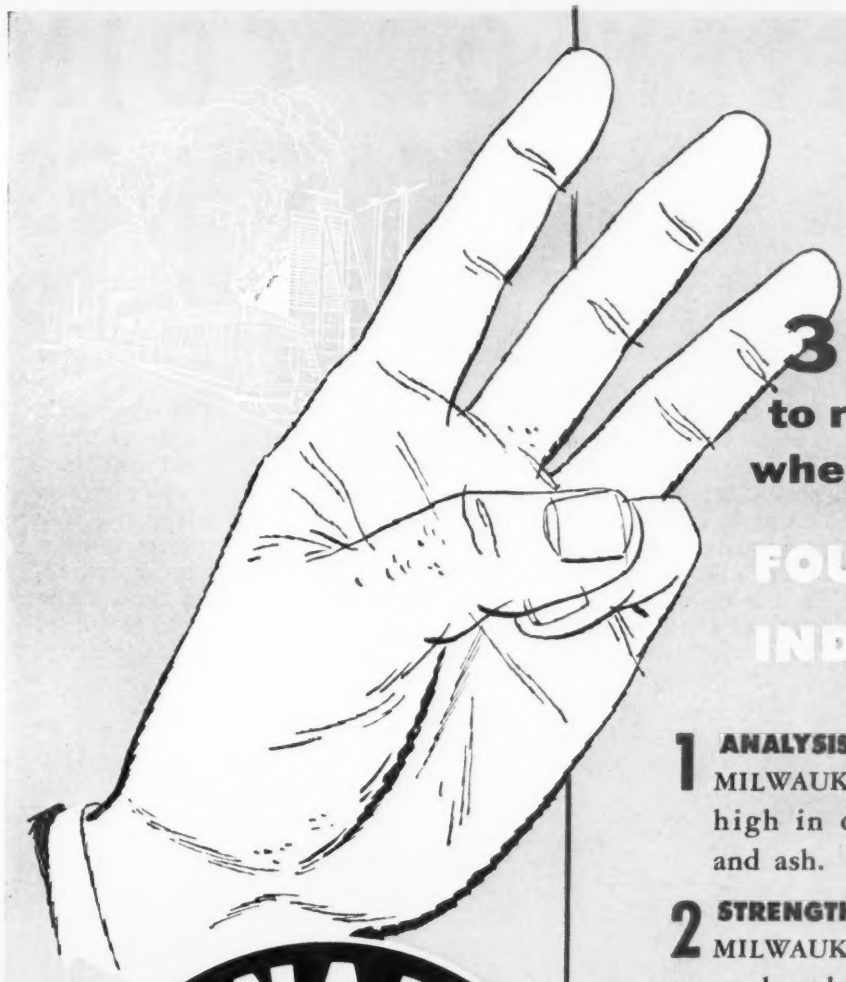
All Clearfield Mixers can be completely controlled by electric timing devices, giving you fully automatic sand preparation. You'll save time, cut costs and assure yourself of a continuous supply of sand prepared exactly as you want it when you employ a Clearfield automatic mixer.

But whether you want automatic or manual control, there's a Clearfield Mixer to provide the exact answer to your sand preparation needs. *Write today for catalog No. 83 for complete details.*

Clearfield Mixer
Mixes, Tempers
Aerates

CLEARFIELD MACHINE CO.

CLEARFIELD, PENNSYLVANIA



3 important facts to remember when you buy

FOUNDRY and INDUSTRIAL COKE

1 ANALYSIS.
MILWAUKEE SOLVAY is uniformly high in carbon, low in sulphur and ash.

2 STRENGTH.
MILWAUKEE SOLVAY is made from coals selected to produce a coke of high resistance to shatter and abrasion.

3 SIZE.
MILWAUKEE SOLVAY is carefully screened to the right size for your requirements.

If you are not using this *quality* product, may we ship you a trial car?

FOUNDRY SERVICE DEPARTMENT AVAILABLE WITHOUT OBLIGATION

MILWAUKEE COKE SOLVAY

P M

SERVING INDUSTRY SINCE 1883

PICKANDS MATHER & COMPANY
Union Commerce Building • Cleveland 14, Ohio
Chicago • Cincinnati • Detroit • Duluth • Erie • Grand Rapids
Greensboro • Indianapolis • Minneapolis
St. Louis • Washington
IRON ORE • PIG IRON • COAL • COKE

STRAIGHTEN OR COIN MALLEABLE IRON CASTINGS ON THE VERSATILE CECOSTAMP

Straightening malleable iron castings has been modernized, speeded up and rejects almost eliminated in a number of foundries by the installation of Cecostamps, replacing old-fashioned strap hammers or board drop hammers. The Cecostamp's blow is instantly controllable by the operator. Misalignment is practically unheard-of—due to the rigid construction of the Cecostamp. There are no time-consuming "friction" or stroke adjustments. Production is high. Maintenance costs are low. Operation is very simple and where very tiring on other types of hammers used formerly, there is little fatigue on the part of the operator with the Cecostamp.

Write for complete details on the Chambersburg CECOSTAMP

Cecostamp straightening malleable iron castings at large foundry in Canada. Board drop hammer was formerly used for this work, requiring stoppage for adjustments and stroke set-up. Cecostamp permits almost continuous operation.

Cecostamp coining malleable iron castings in foundry of implement manufacturing company. Formerly done on a strap hammer, production has been speeded up and accuracy insured.

CHAMBERSBURG ENGINEERING COMPANY • CHAMBERSBURG, PENNA.

CHAMBERSBURG

THE HAMMER BUILDERS

HOW TO PUT THE SQUEEZE ON BLAST CLEANING COSTS

U. S. Patent #2184926
(other patents pending)

. . . ***USE MALLEABRASIVE, SHOT OR GRIT.*** Scientifically heat-treated for durability, Malleabrasive lasts longer. Laboratory controlled for strength and consistency, Malleabrasive cleans better faster. And because it does a better job in less time with fewer refills, Malleabrasive cleans *cheaper!* See for yourself. Next time you order blast cleaning abrasive, specify Malleabrasive from Pangborn Corp., 1400 Pangborn Blvd., Hagerstown, Maryland.

Pangborn DISTRIBUTORS FOR

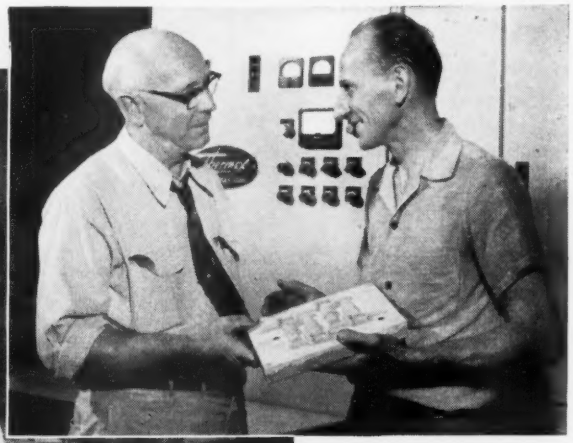
MALLEABRASIVE®

PANGBORN'S 50th ANNIVERSARY—1904-1954

Thermex®
ELECTRONIC CORE-BAKING EQUIPMENT

Boosts output from 1600 to 4500 cores per shift

Estimated savings: $10,000 yearly



● *Earl N. Steel (left), Foundry Superintendent and George Forkey, Core Room Foreman, are pleased with the results.*

● *Loading end of* THERMEX *Core Baker. Conveyor extends 20 ft. to allow core makers to load from their stations.*

ACCORDING to Mr. F. V. Cowing, Vice President in Charge of Production, Repcal Brass Manufacturing Company, Los Angeles, replacement of conventional ovens with a THERMEX* Core Baker has given these results in the manufacture of their plumbing brass goods:

LOWER COSTS. Now produces more cores with *one* shift than formerly with *two* shifts. Ratio of helpers to core makers being cut from 3:1 to 1½:1. Estimated yearly savings: $10,000.

CONTINUOUS FLOW. Fast turnover of core plates enables them to produce 4500 cores continuously per shift with only 35 wood waste driers; where 400 driers were formerly required for 1600 cores per shift.

BETTER QUALITY. Smooth surfaces and perfectly uniform dimensions are obtained, core after core, day after day.

IMPROVED WORKING CONDITIONS. Cooler. No smoke.

Find out how *you* can get startling savings and quality improvements with THERMEX Core Baking Equipment. Call or write The Girdler Company, Thermex Division, Louisville 1, Kentucky.

*THERMEX—Trade Mark Reg. U. S. Pat. Off.

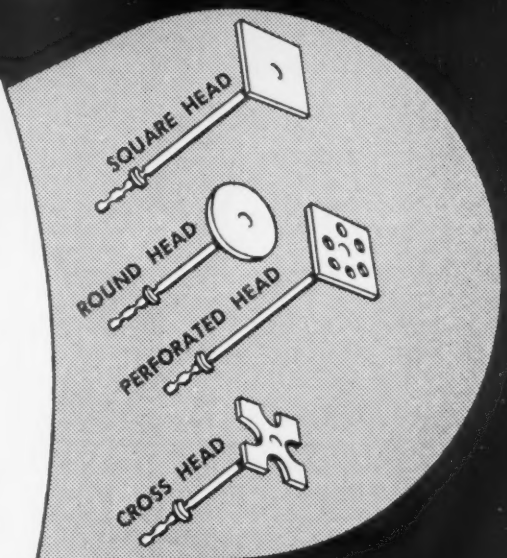
the **GIRDLER** Company

A DIVISION OF NATIONAL CYLINDER GAS COMPANY

THERMEX DIVISION

MILWAUKEE RADIATOR CHAPLETS

give you an *EXTRA* measure of Quality



For Automotive Castings, Stove Castings, Radiator Castings, or when any light pressure high quality castings are desired, be sure to specify MILWAUKEE CHAPLETS and get the very best in shoulder radiator chaplets.

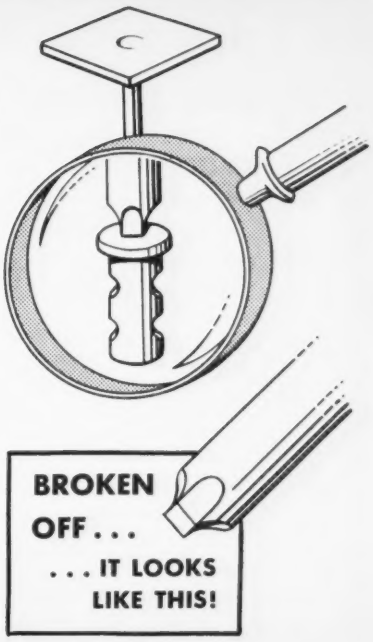
They're precision made of laboratory controlled materials by skilled craftsmen using the most modern manufacturing facilities. You get these outstanding advantages:

• Rigid Specifications • Burr-Less Construction • Clean Break-Off Nicks • Five Inspections • Best Materials for Easy Fusions • Large Dia. of Shoulder for Easy Seating • Thin Shoulders Mean Less Grinding.

NOT ONLY NEW BUT ALSO TRUE

A TRUE FOUR-WAY BREAK-OFF NICK!

Developed at the request of a large Automotive Company, this is a true four-way nick for easy break-off.

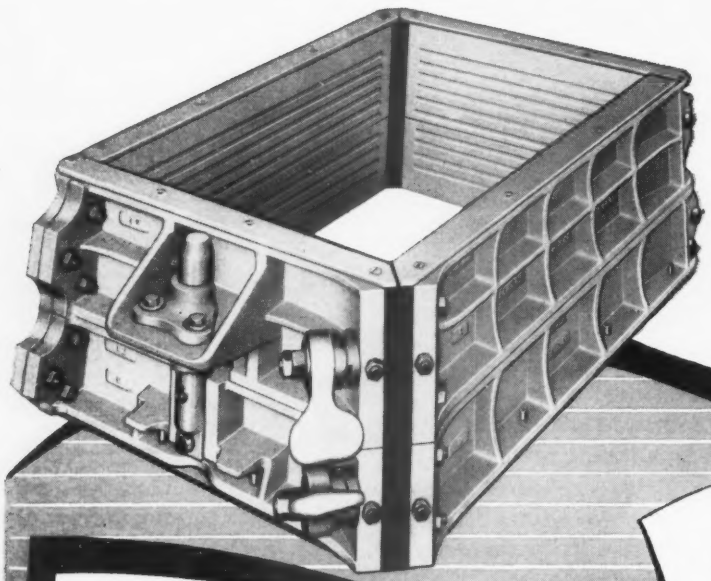


MILWAUKEE CHAPLETS

MILWAUKEE CHAPLET & MFG. CO., INC. 1025 S. 40th STREET
MILWAUKEE 15, WISCONSIN

The Last Word

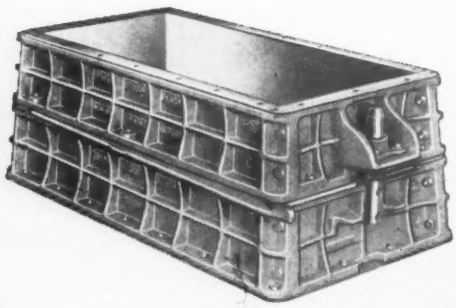
FREMONT SPREADLOCK FLASKS



No sand can lodge in the open corners of Spreadlock flasks. The corner gaps are completely closed by long-life, easily replaceable, live rubber inserts. Made of magnesium, which has twice the tensile strength of aluminum, they afford much longer service and are easier to handle. Accurately machined inside surfaces and flanges, and steel-faced top and bottom flanges assure more exacting work.

PERFECT ALIGNMENT INDEFINITELY!
Guaranteed by the one-inch GROOVLOCK FOOLPROOF PIN on

FREMONT STANDARD SLIP FLASKS



Particularly adapted to cope or drag pattern jobs. Solid, bolted and welded corner construction. Other types of standard pin fittings available.

SAVE BIG MONEY!
The precision machined and drilled, bolted corner construction of

FREMONT CAST IRON OR CAST ALUMINUM JACKETS

permits easy insertion of new sides or ends. Entire jacket need not be scrapped. The standard style is designed for ordinary foundry practice, the grooved style, which permits ready gas escape, is ideal for steel foundries. Flasks and jackets can be assembled on 3°, 4° or 5° taper.

Write today for free literature and prices. All orders given prompt attention.

THE FREMONT FLASK CO.
Fremont, Ohio

Removing gates from aluminum die castings at Milwaukee Die Casting Company. The speed and accuracy of Delta 14" Metal Cutting Band Saws permit each operator to make perfect cuts at the rate of 700 per hour, at cost reductions of better than 50% over previous methods.

"Rejections Eliminated.... GATE REMOVAL COST SLASHED 50% PLUS" with Rockwell-built DELTA METAL CUTTING BAND SAWS

With five cutting speeds, this 14" Delta Metal Cutting Band Saw cuts anything from carbon tool steel to wood and plastics. Tilting table and positive, micrometer controlled accuracy permit close tolerance work on even the most intricate patterns. Completely portable.

"Our Delta Metal Cutting Band Saws have cut costs of gate removal on castings of varied design by better than 50%," report production executives of the Milwaukee Die Casting Company. "They make a perfect cut, have eliminated rejects, and give us far better castings for plating."

Here it is again—PROOF that Delta Metal Cutting Band Saws—and other Delta Power Tools—definitely cut foundry costs, from pattern making to finishing and machining. In foundries and metalworking plants everywhere, the ability of Delta Power Tools to handle multiple jobs quickly and accurately is consistently reducing operating costs, and making for better, higher quality production.

Talk to your Delta Dealer today! Let him prove how Delta Power Tools can save YOU money. He's listed in your classified directory under "Tools" or "Machinery." In addition, send the coupon for full information.

DELTA QUALITY POWER TOOLS

Another Product by Rockwell

Delta Power Tool Division,
Rockwell Manufacturing Co.
706L North Lexington Avenue, Pittsburgh 8, Pa.

☐ Please send Delta AB-54 Catalog.
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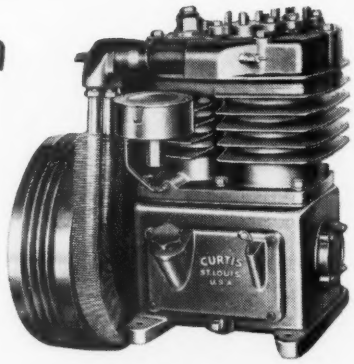
Curtis

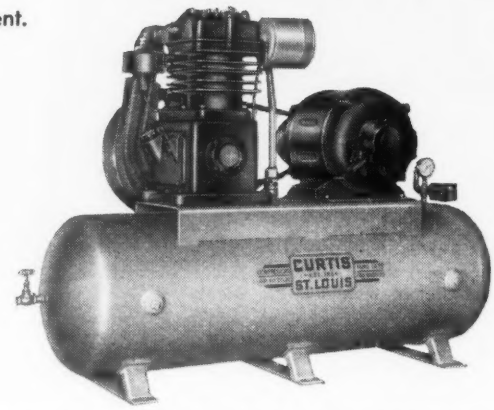
AIR COMPRESSORS, HOISTS and CYLINDERS

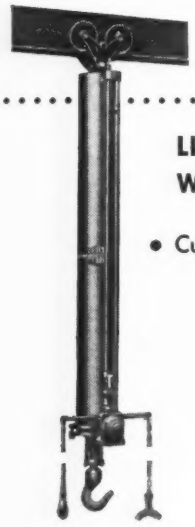
Cut Costs While Speeding Production



AIR TO DO INNUMERABLE JOBS AT LOWER COST WITH A PRECISION-BUILT CURTIS COMPRESSOR

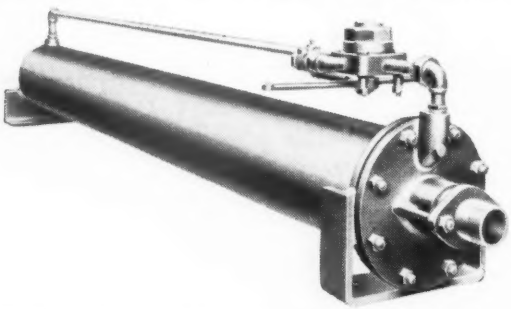
- Timken roller main bearings equipped—easy external adjustment.
- Self-oiling—pressure lubricated rod bearings and piston pins.
- Air-cooled—no danger of freeze-ups.
- Tank Mounted Compressors ¼ H.P. through 15 H.P. (up to 78 cu. ft. displacement per minute)
  Simple Compressors ¼ H.P. through 50 H.P. (up to 300 cu. ft. displacement per minute).





LIFT OR LOWER LOADS QUICKLY WITH A CURTIS "ALL STEEL" AIR HOIST

- Cut costs with these time-saving, work-saving air-powered hoists.



PUSH IT, PULL IT, LIFT IT, LOWER IT WITH A CURTIS "ALL STEEL" AIR CYLINDER

- Curtis Bracketed Air Cylinders can work in any position from horizontal to vertical.
- Delicate control of lifting and lowering speeds.
- Cylinders ground and polished on inside diameter.
- They bring new time-saving ease where lifting, lowering, pulling or pushing is required.
- Valve is disc type. Returns automatically to neutral position when operating chains are released . . . and effectively hold the load.

Get all the facts about cost-cutting Curtis equipment!

1854 **100** 1954 years

Curtis PNEUMATIC MACHINERY DIVISION
of Curtis Manufacturing Company
1922 Kienlen Avenue · St. Louis 20, Mo.

-806

"TELL-ALL" panel gives you four advantages

The *Foundromatic* dryer gives you all the advantages of dielectric drying plus the operational convenience and simplicity of "Tell-All" control.

1. Meters, lights, buttons are panel mounted at eye level, enabling operator to keep on top of operation at all times.

2. Electrode control permits adjusting to the physical variances of cores.

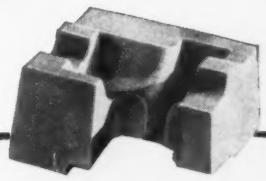
3. Electrical overloading is prevented by the belt-loading control. Conveyor stops when load is too great.

4. Automatic grid control assures correct drive to oscillator tube regardless of oven load.

Advantages of Dielectric Drying Over Oven Drying

Drying time measured in minutes — smoother core finishes — superior shakeout characteristics — clean, cool core rooms — elimination of core storage — 60% fuel savings — all these advantages are yours with dielectric drying.

Compare features and operating records of the various dielectric dryers available. You will discover, because it is easier to operate, the *Foundromatic* dryer augments and multiplies the inherent advantages of the dielectric method.



Six minutes is all it takes to dry this core in a *Foundromatic* dryer. The job would take 70 minutes in a conventional oven.

Get all the facts on dielectric core drying — call your nearby Allis-Chalmers district office or write Allis-Chalmers, Milwaukee 1, Wisconsin. Ask for Bulletin 15B7306B.

A-4450

Foundromatic is an Allis-Chalmers trademark.

ALLIS-CHALMERS

TOUSEY PRODUCTS

DURACOTE for DURABILITY

Color matching at Tousey is most important in the production of high quality finishes. ★ Each order is manufactured to an exact formula and compared to a material standard for preliminary approval. ★ A final check is always made by men with years of experience in color matching, men with the ability to note even the slightest variation from the original, and proper training in how to correct it. ★ This experience and know-how is available to help you solve your finishing problems without obligation.

TOUSEY VARNISH CO. 520 W. 25th St., Chicago 16, Ill.

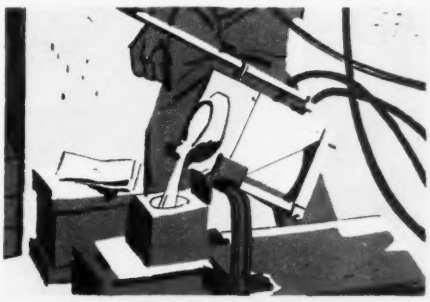
Greater Hot Strength...

Globe Dextrines are superior to ordinary cereal binders. Regardless of the heating cycle, Globe maintains surface hardness that resists washing even at high pouring temperatures.

Quick Drying...

This property cuts down oven time, thus increasing oven capacity.

Why GLOBE® dextrines regulate core hardness



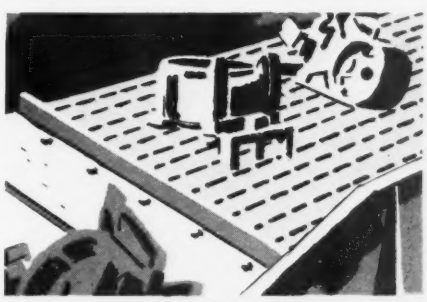
Excellent Permeability...

You reduce costly "blows" and casting losses due to inadequate venting.

The variety of solubilities available in Globe Dextrines enables you to achieve the degree of surface hardness you require. The controlled migrating properties of Globe Dextrines assure you of a smooth, hard surface when you want it and complete burn-out at the proper moment. Globe Brand Dextrines enable you to achieve exactly the collapse rate you desire, thus assuring you of clean castings with close tolerances and a minimum of scrap.

Always available, these uniform dextrines may be obtained in the solubilities you require.

Ask our technical service people how Globe Dextrines can help solve your casting problems. A special new foundry laboratory is ready to serve you. There is no charge or obligation for this service.



Adequate Collapsibility...

Globe burns out at just the proper instant, eliminating strains and hot-tears.

GLOBE BRAND

DEXTRINES AND GUMS

CORN PRODUCTS REFINING COMPANY · **17 Battery Place, New York 4, N. Y.**

Foot and Leg Protection

Stretch

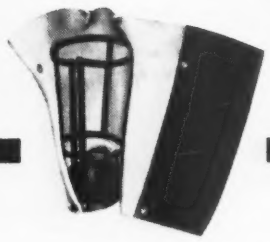
Your Legging Money

Farther with the

NEW

AO 1512R-CL LEGGING

with Replaceable Fabric or Frame



COVERING OR SPRING MAY BE REPLACED SEPARATELY!

You put your best foot forward financially when you choose this spring type legging to protect your worker's legs and ankles. Why? Because both the frame and fabric are removable and replaceable. Should either the frame or the fabric become unusable, either can be replaced. This feature is a great advantage over most leggings from a cost standpoint; yet the worker's safety and protection have in no way been minimized.

This very serviceable legging is available in chrome-tanned cowhide as the 1512R-CL . . . in asbestos as the 1481R-A . . . in flame-resisting duck as the 1482R-FR. Your AO Safety Products Representative can supply you with this highly serviceable protection.

NOTE: We recommend AO chrome-tanned cowhide or asbestos for protection against heat, sparks, and hot metal splashes. AO flame-resisting duck will do a fine protective job against sparks.

Look for the AO trademark for top quality in protective equipment

American Optical

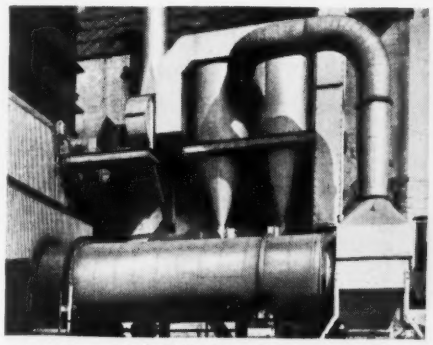
SAFETY PRODUCTS DIVISION

AO SAFETY ZONE

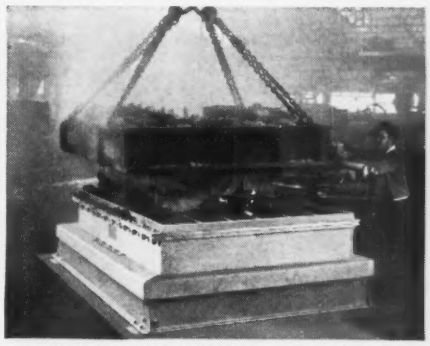
Keep your workers in the Safety Zone with AO Safety Equipment

SOUTHBRIDGE, MASSACHUSETTS • BRANCHES IN PRINCIPAL CITIES

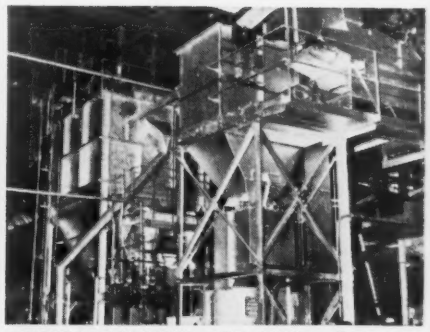
For handling sand and castings--



DRYERS — Link-Belt Roto-Louvre uniformly dries and cools large tonnages of sand. Floor space is conserved because no extra cooler is required.

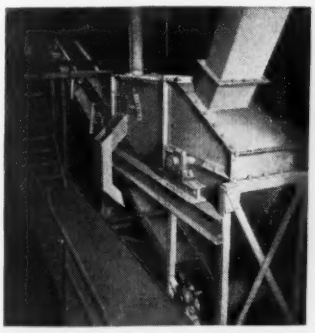


SHAKEOUTS AND SCREENS — Complete line provides centralized separation of sand and castings or sand screening for every type and size foundry.

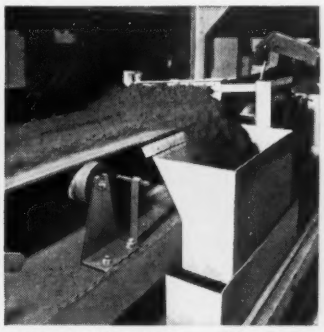


BUCKET ELEVATORS AND BINS — Low-cost elevating and storage of sand. Sturdily built in a wide range of types and sizes.

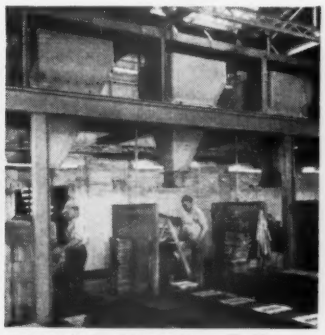
LINK-BELT quality equipment...



REVIVIFIERS — Thoroughly disintegrate, blend, cool molding sand so it will ram to uniform density. Also remove shot.



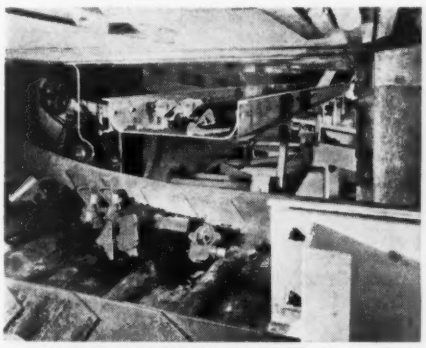
BELT CONVEYORS — Flat belt has plows to distribute sand to molders' hoppers. Troughed type used for other sand handling.



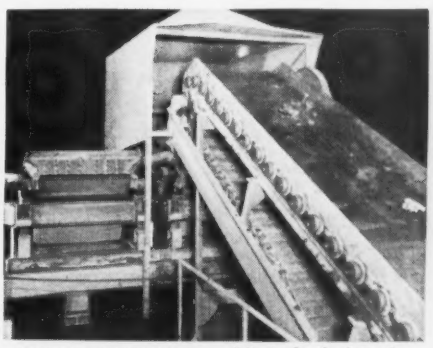
MOLDING HOPPERS — Built to avoid arching and allow free sand discharge with easy-operating duplex discharge gates.

MOLD CONVEYORS — A full line of car, pallet, roller and trolley types meets all variations of foundry practice.

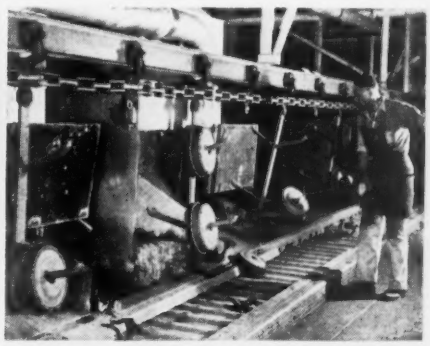
cuts your costs every step of the way



OSCILLATING CONVEYORS — Ideal for hot shakeout sand and castings. One-piece, all-metal trough eliminates wear, leakage. With screened trough section, acts as shakeout.

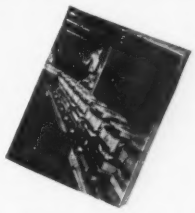


APRON CONVEYORS — No-leak design for long-life service on hot sand and castings. Operates in horizontal or steeply inclined paths. Also good as sorting conveyor.



OVERHEAD TROLLEY CONVEYORS — Cores, molds and castings are economically handled. Complete flexibility of path and capacity provided plus saving of floor space.

Ask your nearest Link-Belt office for new Book 2423. It shows Link-Belt's complete line of modern equipment for ferrous and non-ferrous foundries plus 7 tested layouts.



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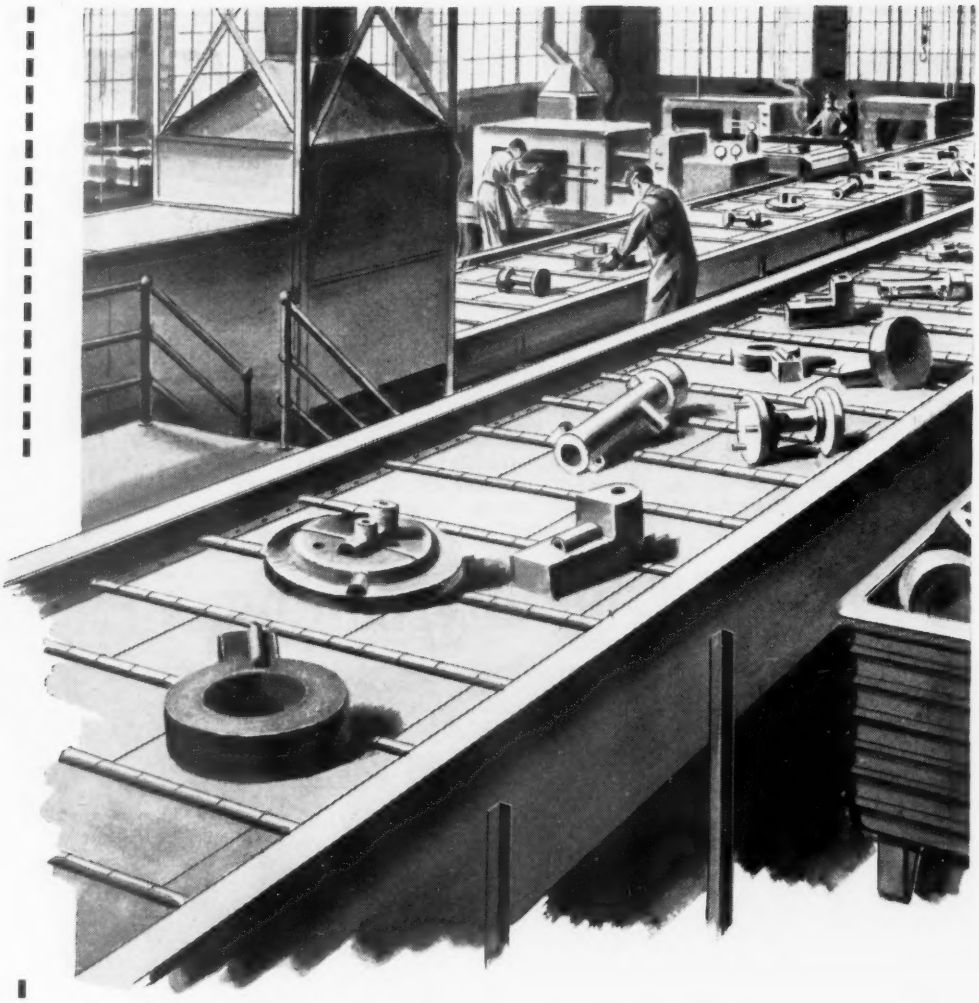
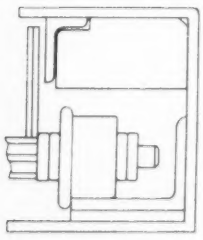
LINK-BELT COMPANY: Executive Offices, 307 N. Michigan Ave., Chicago 1. To Serve Industry There Are Link-Belt Plants and Sales Offices in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World.

13.553

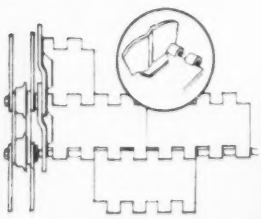
the belt with 9 lives



May-Fran hinged-steel conveyor belt . . . out performs them all in the foundry



Drawing shows construction details of "skirt" which prevents entry of foreign matter and protects side chains.



Outside links incorporate interlocking wings . . . remain positively engaged at all times.

May-Fran Belting is precision formed . . . specifically designed and developed to handle hot, heavy and the most abrasive parts. That's why it has nine lives.

Heavy gauge hinged-steel links are connected in horizontal rows by means of high-carbon steel rods. Side chains become an integral part of the locking wings which remain positively engaged at all times. Link and rod construction eliminates fall-through.

Widths furnished from 6-inches to 6-feet can meet your specifications for a steel conveyor belt of any length or carrying capacity. Either solid or perforated links are available in 2½, 4, 6, 9 and 12-inch pitch lengths. For conveyor belting that out performs, out lives them all . . . specify May-Fran Hinged-Steel Conveyor Belting.

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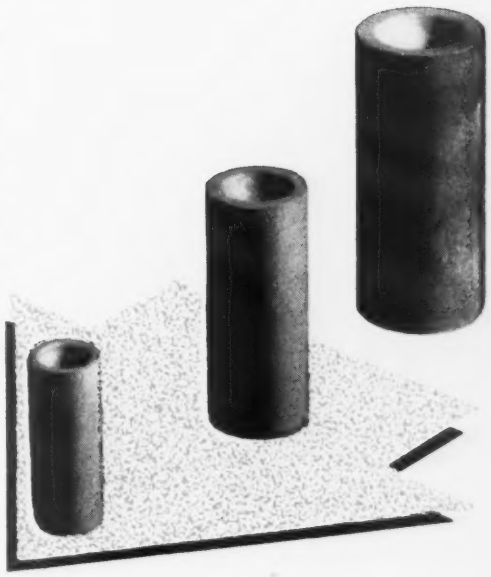

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AMERICAN BRAKE SHOE COMPANY Builds Plant in *Birmingham* Area to Make New Southern Cast Steel Wheel

New SOUTHERN CAST STEEL WHEEL latest development in the field of railroad equipment.

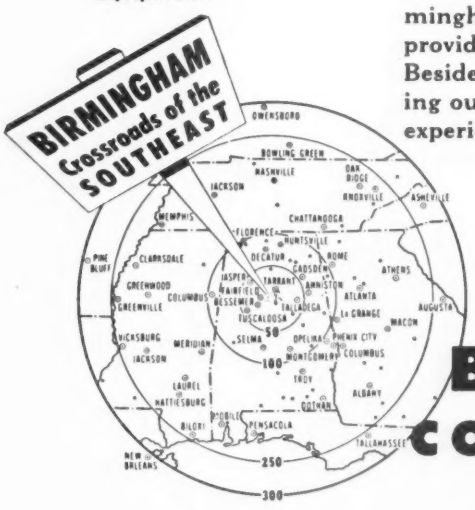
A brand-new type of cast steel wheel for railroads serving the South will be rolling soon from American Brake Shoe Company's modern electric foundry in the central Birmingham District. The new wheel is the culmination of many years of research and road testing by the Company's Southern Wheel Division. The new foundry, built by Daniel Construction Company of Birmingham, is the first installation for its manufacture. It incorporates the most advanced foundry techniques, including electric furnace melting, close metallurgical control and precision heat treating.

Southern Wheel officials gave these reasons why the Birmingham District was selected as the site of the new plant:

"There is an obvious reason why we have located our new steel wheel plant at Calera, viz.—our belief that the Birmingham District as the hub of Southeastern railroading provides a growing potential market for this type of wheel. Besides, we have had fifty-seven years experience in operating our cast iron wheel foundry in Birmingham—successful experience in an area we know and like."

★ ★ ★ ★ ★ ★

The Birmingham Committee of 100 invites inquiries from those interested in the establishment of plants, warehouses and sales offices in the central Birmingham District, from which growing Southern markets can be served most rapidly, advantageously and economically.



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1914 Sixth Ave., N., Birmingham, Ala.

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Now! TOCCO* Induction Melting Furnaces for Precision Casting

One of the TOCCO Induction Melting Furnaces used at Arwood Precision Casting Co. Note TOCCO control station in background.

● Engineers at Arwood Precision Casting Co. use TOCCO Induction Melting Furnaces for melting and remelting quality steel. Other companies have found TOCCO equally adaptable for melting non-ferrous metals. No wonder! *Look at the advantages:*

- ★ Stepless power control
- ★ Extremely Rapid Melting
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- ★ Good Mixing because of Natural Agitation
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- ★ No Carbon Pick-up
- ★ No Contamination when Composition of Charges is Changed
- ★ High Reproducibility of Results
- ★ Minimum Space Requirements
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- ★ Simple, Safe Operation
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If any of these advantages suggest economies in your operations write for full details—no obligation, of course.

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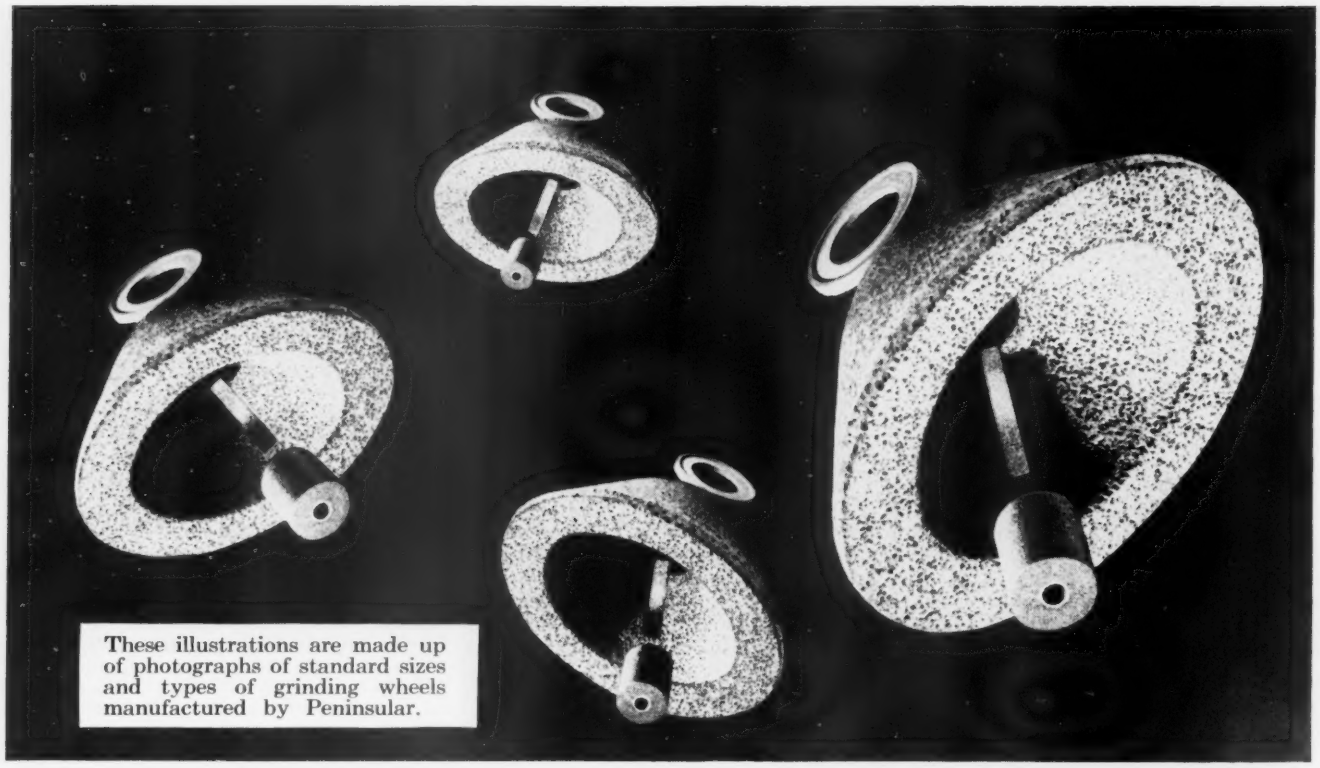

These illustrations are made up of photographs of standard sizes and types of grinding wheels manufactured by Peninsular.

Why PENINSULAR 4-Bell Grinding Wheels cost less per pound of stock removed

SERVICE—Our abrasive engineers study the grinding applications in your foundry to establish the exact specifications required.

PERFORMANCE—Building the wheel to your exact specifications means *more pounds of metal removed per cubic inch of abrasive used.* And that means *cost-reducing performance.*

QUALITY—Rigid standards of quality and safety are maintained. Precise control methods insure consistent duplication of your exact specifications.

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"PLAY IT SAFE"

The **4-bell** color safety film, "Play It Safe," still available for showings. Explains how to avoid the major causes of breakage. Write: Peninsular Grinding Wheel Sales Corporation, Department B.

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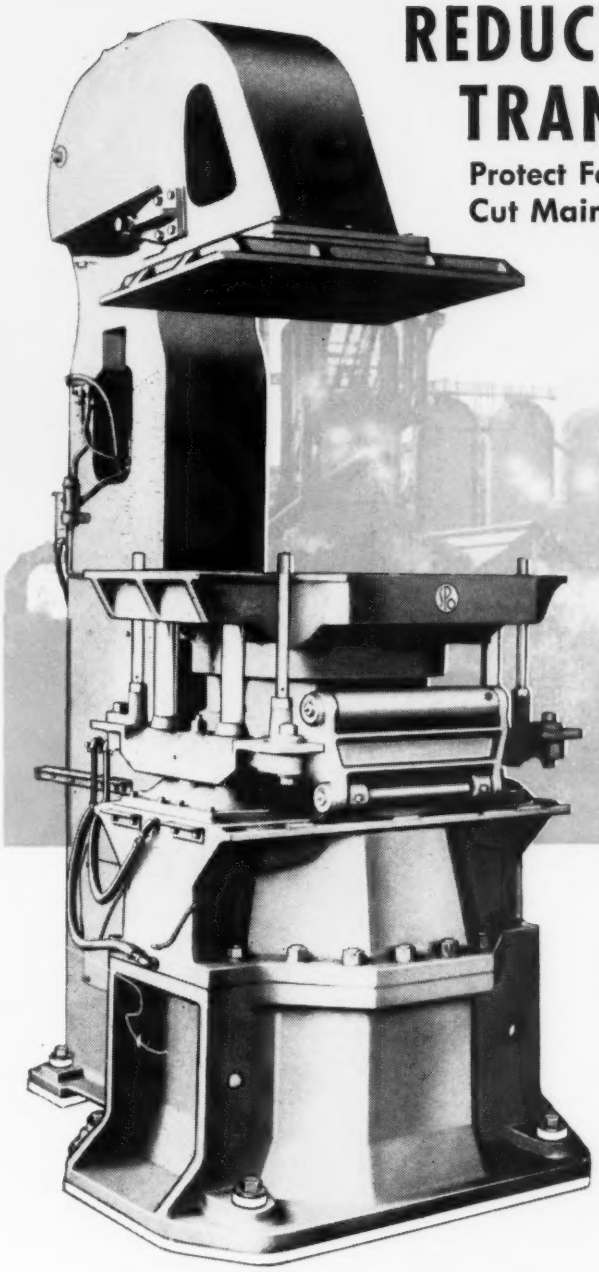
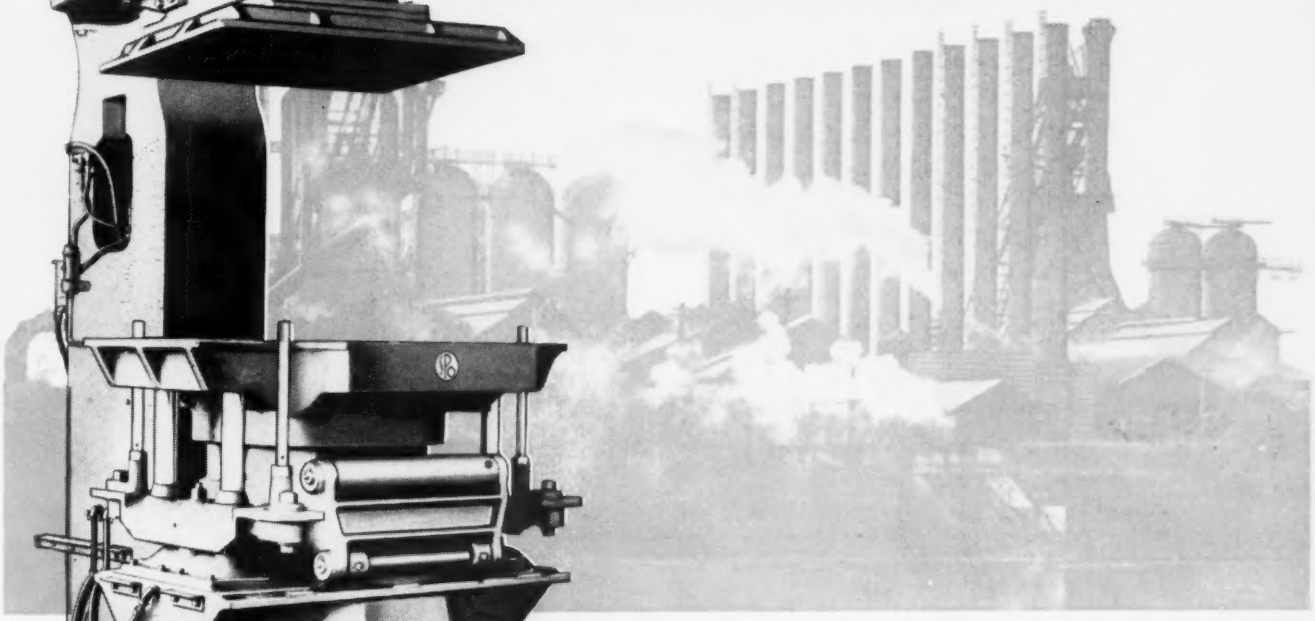
Cut Maintenance Costs and Improve Production





For severest service under heavy loadings, it pays to specify FABREEKA Pads, proven by over 20 years successful performance.

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IN THE STEEL INDUSTRY

STEEL PLANTS—Traveling Bridge Cranes, Ore Bridges, Ingot Trucks and Buggies, Skip Hoists, Transfer Cars, Pusher Tracks.

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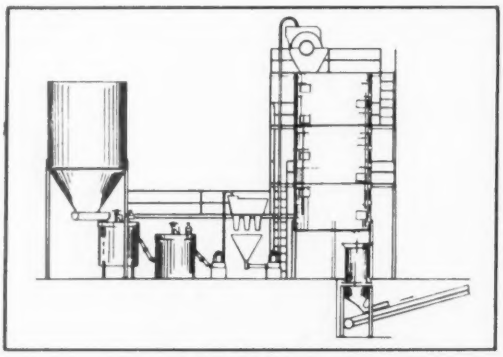

Typical Nichols High Temperature Sand Reclamation System

NICHOLS

Sand Reclamation Systems

1. HIGH TEMPERATURE BURNING
2. LOW TEMPERATURE DRYING

Only Nichols offers to the foundry industry both high temperature burning and low temperature drying in two completely integrated systems. Both are completely tested, both have proved their worth in tangible savings to foundries.

Nichols' 15 years experience in the thermal reclamation of used foundry sand is backed by more than half a century of close association with the design and development of thermal processing methods and equipment, now in use by almost every industry, worldwide.

Completely equipped and staffed pilot plant and laboratory facilities are maintained at Netcong, N. J., where we will be glad to test and process samples of your used foundry sand to determine which of the Nichols systems will fit your requirements and to prove to you its merits.

Please write for Bulletin No. 222

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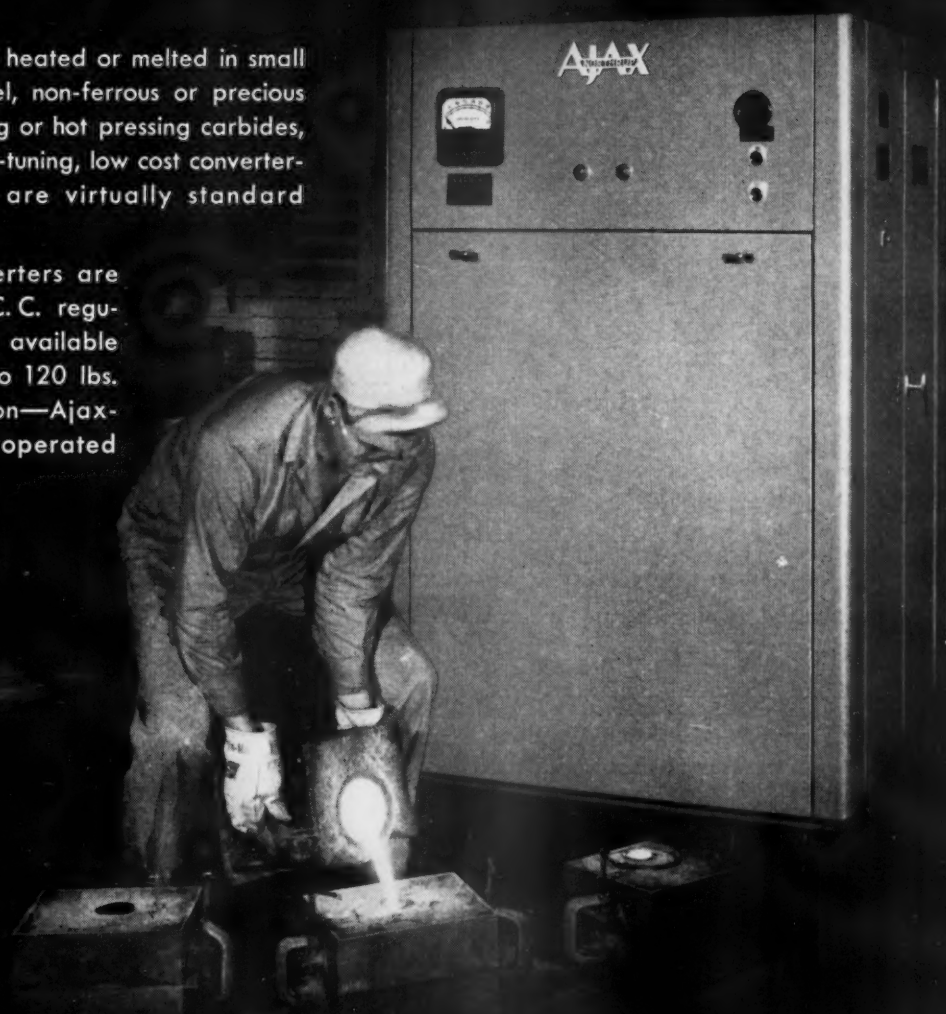

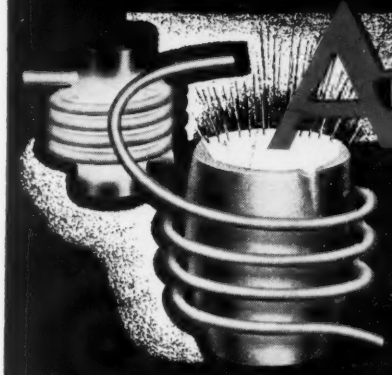

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AJAX ELECTROTHERMIC CORPORATION • TRENTON 5, NEW JERSEY

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ASSOCIATED COMPANIES: AJAX ELECTRIC FURNACE CORPORATION • AJAX ELECTRIC COMPANY • AJAX ENGINEERING CORPORATION

Sterling

225 Sterling Wheelbarrows used daily in this modern production foundry.

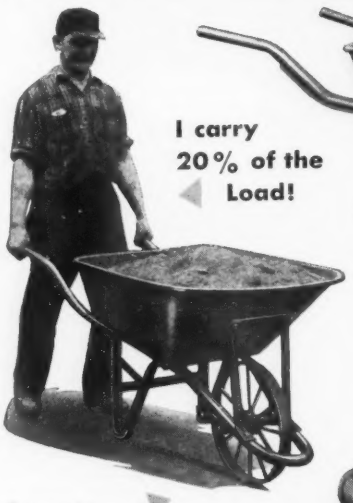
They Just Keep Rolling Along!

Sterling

Pneumatic-tired roller bearing wheels assure smooth wheeling and easier handling.

50 years ago, wheelbarrows were used extensively for wheeling sand, castings, scrap, etc. in American foundries. Today . . . even in this highly mechanical age . . . wheelbarrows are just as important as a means of material transport, and just as economical. They require no skilled labor and certainly present no maintenance problem. There is nothing to get out of order. They just keep rolling along.

Sterling All-Steel Wheelbarrows with Tubular Frame are tailor-made for foundries. They are ruggedly constructed to take hard everyday punishment and come back for more. Cost-saving features include: steel tray with lapped corners — all-welded construction, no rivets — heavy steel reinforcing rod rolled around top edge —V front braces and cross supports — All parts securely anchored to the sturdy, one piece steel frame. Be sure to specify STERLING on your next barrow order. IMMEDIATE DELIVERY.



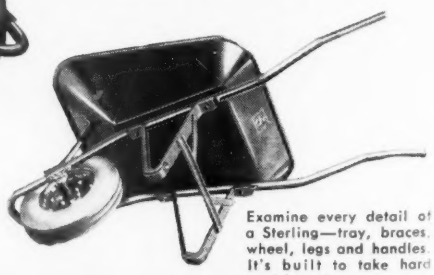
I carry 20% of the Load!

Model DF4-S for Extra Heavy Duty

A husky steel plate reinforcement supports the front, back and bottom of tray. Prevents breakage and distortion. Adds years to the life of the barrow.

I carry 80% of the Load!

Sterling's scientifically balanced construction actually takes 80% of the load off the arms and backs of the barrow men. Crews work faster, make more trips per day.



Examine every detail of a Sterling—tray, braces, wheel, legs and handles. It's built to take hard punishment.

Sterling **WHEELBARROW CO.**

Milwaukee 14, Wisconsin, U.S.A.

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Restrictions Are Needed

When the Department of Commerce removed all restrictions on the exportation of ferrous scrap during the fourth quarter of 1953, foundrymen protested vigorously (FOUNDRY for December 1953, page 101). The industry took the stand that good scrap constitutes a basic metallic for the foundry industry which only a few months before had been in short supply, and that restrictions should be placed on that type of scrap.

To allay the fears of the foundry industry, which is made up mainly of hundreds of plants falling into the category of small business, the department promised to keep a sharp eye on the situation to be sure that too much was not exported. Now that a year has passed since these protests were made, it should be interesting to look at the record.

Little scrap was exported during the fourth quarter of 1953. For the first six months of 1954, licenses were issued for the exportation of 592,317 tons (excluding Canada). During the third quarter, licenses totaled 844,180 tons, or a total of 1,436,497 tons for the first nine months. Licenses were issued for 214,151 tons for the first seven days of October, making a total for the year through Oct. 7 of 1,650,648 tons. The trend is obvious. Unless action is taken to reduce the recent rate of increase, tremendous tonnages of ferrous scrap will be exported in the very near future.

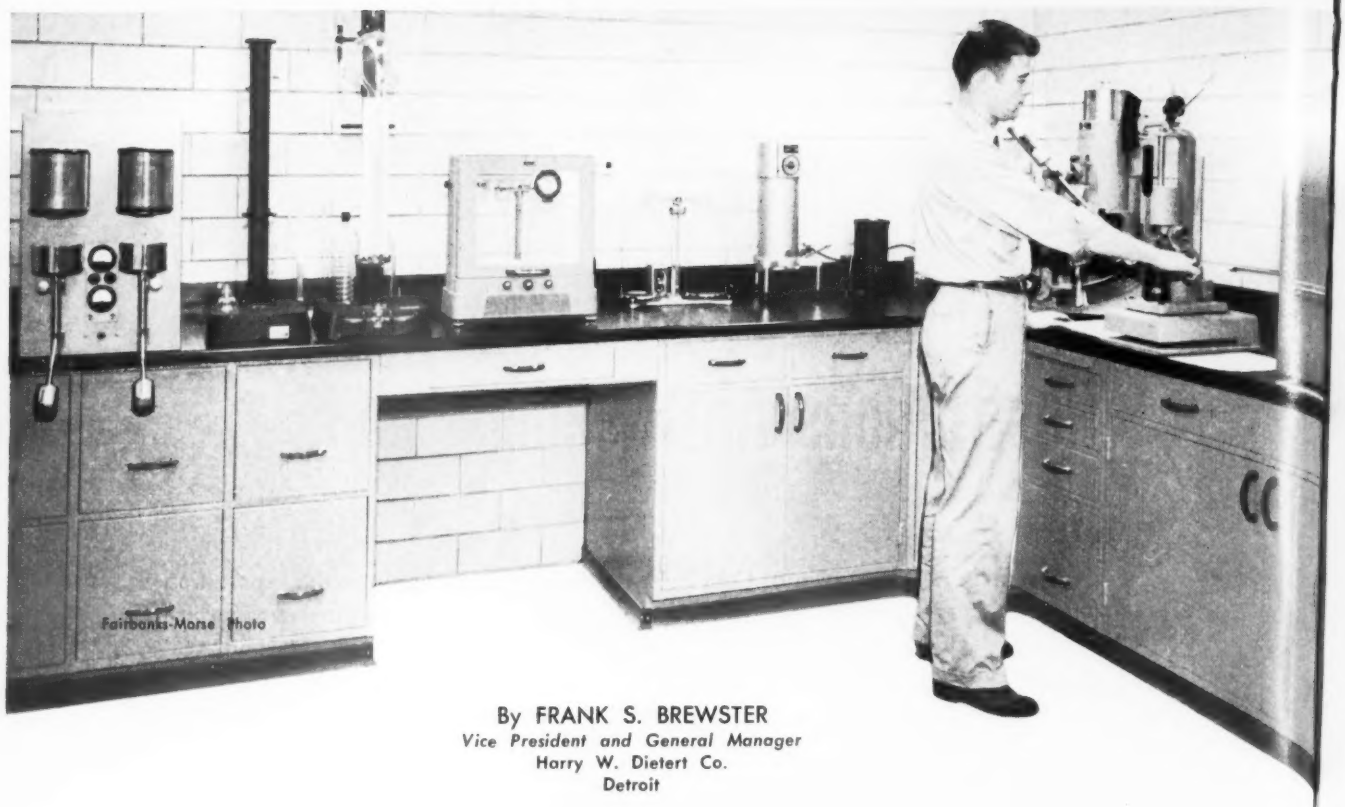
Department of Commerce officials are reported to be keeping an eye on the export situation. But absence of any action by the department to slow down the rapidly increasing flow of scrap to foreign countries indicates that government and much of the metalworking industry differ widely as to the amount of scrap that can be exported with safety to the national interest at a time of great tension throughout the world. Many still feel strongly that good grades of scrap should not be exported.

If you are of the opinion that in the national interest ferrous scrap exports should be curtailed or controlled as to type, why not register your protest on the present unrestricted flow of this important resource to the Secretary of Commerce, your senator and your congressman.

The present situation demonstrates again that the wheel that squeaks the loudest gets the grease.

Frank G. Steinebach

Editor



By FRANK S. BREWSTER
Vice President and General Manager
Harry W. Dietert Co.
Detroit

PRACTICAL MOLDING SAND CONTROL

for the average foundry

Sand is a mixture of natural minerals which respond to scientific treatment. Study and application of known principles and laws of sand management offer the greatest possible improvement in foundry efficiency today

THE sand in your foundry is *not* a pile of dirt, unpredictable and capricious. Rather, it should be viewed as a mixture of natural minerals which will respond to scientific treatment. And yet, some of the laws governing its actions are still to be discovered. It is to some extent this very fact that makes a study of sand so interesting and rewarding.

The greatest possible improvement in foundry efficiency today awaits those who have the patience to study and apply the known principles and laws of sand management.

Sand Properties—Thousands of words have been written and many approaches presented on foundry sand. Some of the resultant confusion can be dispelled if the field is separated into six groups from choice of materials to finished casting.

1. *Structural Properties*: Grain fineness, grain distribution, clay content, combustibles and alkalinity (pH).

2. *Green Properties*: Moisture, green strength, green deformation, green permeability, green hardness, flowability and rammability.

3. *Air Set Properties*: Air set strength.

4. *Dry Properties*: Dry strength and dry permeability.

5. *Hot Properties*: Hot strength, hot deformation, hot permeability, sinter point, spalling, expansion, gas pressure, penetration and mold atmosphere.

6. *Retained Properties*: Retained strength.

The structural properties are basic in that they govern the other five groups but cannot be related to a particular phase. From a control standpoint it is necessary to make these tests in order to regulate additions intelligently. They show what is in the sand while the other groups show what the sand will do.

Ease of molding with its close relation to molding speed is governed by the green properties. Here, then, is a field where yield of good molds per hour can be increased by finding optimum values and maintaining them.

Air set and dry strengths have some bearing on molding, for instance, in the setting of cores or closing, and also show a relationship to the occurrence of dirty castings.

Once pouring starts, hot sand and its ability to contain and shape the molten metal become important. Hot properties, therefore, determine casting quality. It is seldom, if ever, possible to predict from its room temperature properties how a sand will act when hot. Thus, the most effective sand control program will include a knowledge of high temperature reactions.

Retained properties bear a relation to shakeout, knockout and cooling crack problems. Attention to this phase can save money by reducing the effort necessary to separate sand, flask and casting.

Approach to Sand Control—Obviously some of these above-mentioned tests are more important and necessary than others. There also must be a balance between the total amount of money and effort expended on sand testing and the value of the product. For these reasons, the order in which a foundry would initiate the tests is not in the same order as above. Another factor is the ability to group certain tests and equipment together.

A recommended order of attack for molding sand is as follows:

Group A

Moisture, permeability, green compression strength, green deformation, dry compressive strength, air set compressive strength and green hardness.

Group B

Clay content, grain fineness and distribution, and combustibles.

Group C

Hot compressive strength — 500°F, 1000°F, 1500°F, 2000°F, 2500°F; hot deformation — 500°F, 1000°F, 1500°F, 2000°F, 2500°F and spalling.

Group D

Flowability and gas volume or pressure.

Research Tests

Expansion, sintering, density, hot permeability, pin penetration, own atmosphere, deformation-strength charts and alkalinity.

All foundries have a definite need for Group A, especially moisture and green hardness. These two variables are the most powerful of all since they cause all other properties to vary along with them. Foundries having much cored work and those using compounded sand have a definite need for Group B.

Group C is one of the most important, since it is here that we touch on casting results directly. Group D rounds out a substantial control program.

The research tests are so listed either because their true value and correlation has not yet been fully worked out or because there is no good means for controlling such a property.

Hot expansion is a most important characteristic of silica sand, being the basic cause of many high-temperature failures. It is not a control test, however, since we do not have the means available to reduce it to a safe low value of 0.010-in. or less. It is, nevertheless, necessary to know what the expansion is, in order to know what allowance must be made for it.

Limits of Sand Control—Granting for the moment that foundries will benefit by controlling sand properties, how may control be defined? How much leeway is permitted for variation without upsetting the molder's rhythm or risking the pouring of scrap castings? How precise can laboratory measurements be? Table I gives an idea of what

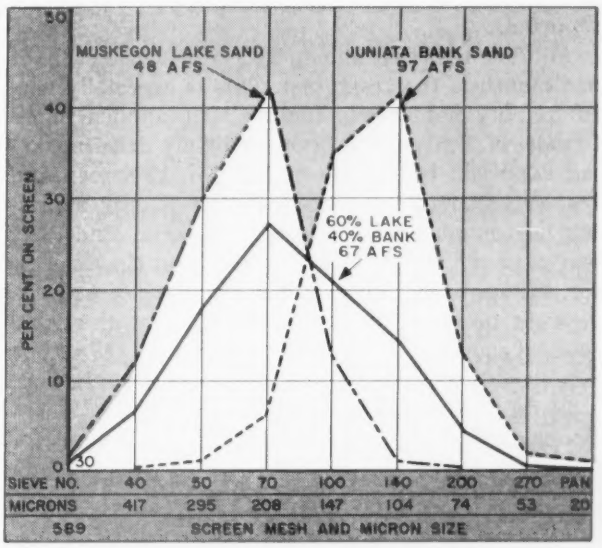


Fig. 1—Screen analysis of a mixture shows how resultant grain distribution can be calculated

might be considered good control. Such a range of variations should be the aim of all sand control programs. Recommendations as to actual, definite values are not given in this table nor should they be. These must be determined in each foundry on the basis of which set of values give the most satisfactory castings.

The limits shown for grain fineness are meant to apply to sand systems or heaps and not necessarily to new sand shipments. Often it is necessary to have more than one fineness on hand so that trends due to agglomeration, dust suction systems and core sand influx can be corrected. Fig. 1 illustrates how resultant grain distributions may be cal-

culated from original curves. The per cent lake sand on a given screen is multiplied by 0.6; the per cent bank by 0.4 and the two products added to give the per cent of the mixture on that screen.

In any foundry having a shakeout screen it is quite likely that today's core sand is tomorrow's molding sand. This is the basic reason why the man responsible for the molding sand must also be allowed to choose the core sand.

The idea may be old to some and startling to others, but one way to keep grain distribution in the system in balance is to use fine and open sands in the same ratio in the coreroom as you want them in molding sand. Many times, side cores, etc., can be loaded with bank sand to compensate for jacket-like cores that must be made of sharp sand.

A new system sand should be started out finer than the expected running condition. It is not uncommon for a new sand of 40 permeability to go to 70 permeability in a few months simply by agglomeration of some of the finer grains. The extent to which this occurs can be determined by making an "as is" screen analysis on the sand (air dried and not washed free of clay) and comparing this with the usual washed and dried screen analysis. Fig. 3 shows the results of such a test. Note that the grain distribution which actually exists can be quite different from that normally reported.

Another test that should be made at intervals of one month is the trash test. This is especially useful in any nonferrous foundry but applies to all foundries. Ten pounds or more of air dried shakeout sand can be put through a No. 12 screen and the weight of trash noted. It is not only suprising how many kinds of foreign material find their way into the system but also how bad they can be for the casting. It is entirely practical to bring a crew in on a weekend and put all of the system sand through a riddle. As an example, five men have repeatedly put 200 ton of system sand through a 24-in. square riddle of 10 mesh in 8 hr. About 5 tons of trash are not uncommon.

Moisture—It must be emphasized over and over that moisture is the No. 1 variable. If moisture is not held within proper limits control on the remainder of the properties will be almost impossible to maintain.

Fig. 4 illustrates how important moisture is to a few of the physical properties. Other green and hot properties show similar strong effects.

True, compensation can be made for moisture variation on test figures for strength, etc., but nothing can be done for the sand that is too weak in the mold because the moisture is too high. Fortunately, automatic devices that can control moisture to the required degree are available without reliance on hand feel and personal judgment. Fig. 5 shows how such a system operates. Signals from moisture sensitive and temperature sensitive elements placed in the batch hopper are relayed to appropriate instruments. These signals are integrated to set up a demand for the required gallons of water in the tank which satisfies a third circuit. Then at the desired moment the measured

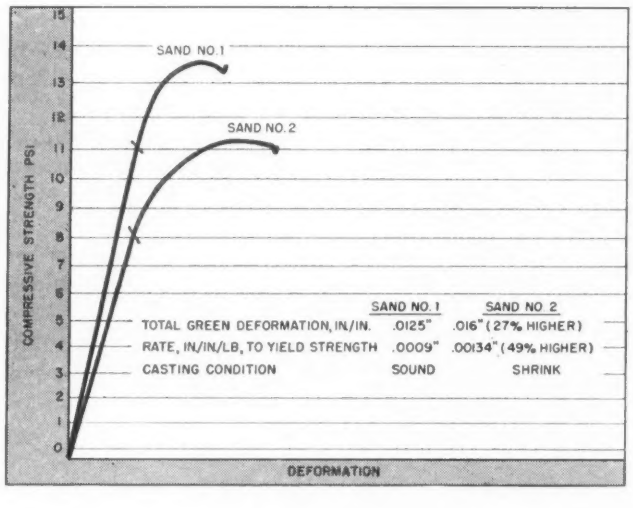

COMPRESSIVE STRENGTH PSI
DEFORMATION
SAND NO. 1
SAND NO. 2
SAND NO 1
SAND NO 2
TOTAL GREEN DEFORMATION, IN/IN. .0125" .016" (27% HIGHER)
RATE, IN/IN/LB, TO YIELD STRENGTH .0009" .00134" (49% HIGHER)
CASTING CONDITION SOUND SHRINK

Fig. 2—Strength-deformation curves for molding sands of high and low shrinkage characteristics

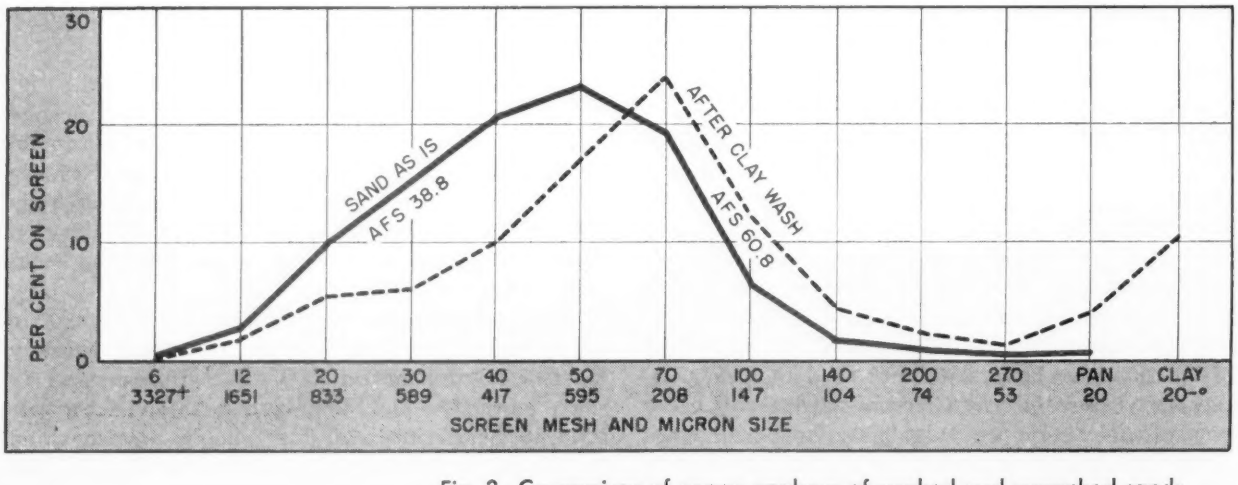

PER CENT ON SCREEN
SAND AS IS
AFS 38.8
AFTER CLAY WASH
AFS 60.8
6 12 20 30 40 50 70 100 140 200 270 PAN CLAY
3327+ 1651 833 589 417 595 208 147 104 74 53 20 20-0
SCREEN MESH AND MICRON SIZE

Fig. 3—Comparison of screen analyses of washed and unwashed sands

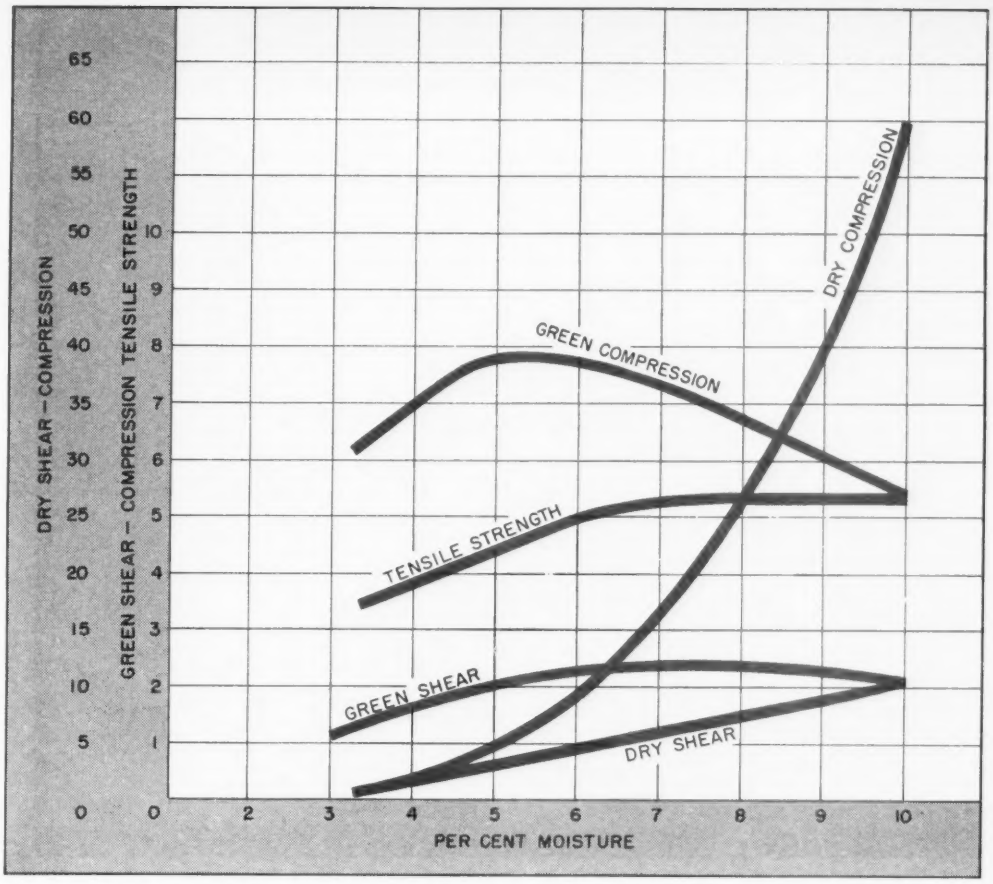


Fig. 4 — Chart showing importance of moisture to some of the physical properties of sand

amount of water enters the mill before, with or after the batch of sand from which it was calculated. It is not uncommon to achieve moisture control to within 0.1 per cent with such a system.

The correct moisture for a given sand is that which will give the right amount of plasticity or green deformation. Thus, if the limits for moisture noted in Table I are observed, deformation also will be under close control.

Permeability—It has been said that permeability can be varied widely with impunity, but that is not so. Most foundries are using too open a sand. There are several reasons. One is that if 40 permeability will make a job free from blows, the 80 permeability will be a safe bet. Because if the sand mixer puts out a wringing wet batch, good castings still can be produced. Thus, all the castings are too rough. The sand is tough to ram, but it dries out fast. Then, too, any gas hole is apt to be used as an excuse for opening up the sand when the trouble could as well be due to foreign material, wet clay balls, wet chills, or other accidents which increased permeability will not cure.

To make acceptable castings in green sand, finer sands should be used. Permeability should be lowered with better control of temper.

Furthermore, the permeability test is sensitive to changes in the structure and composition of sand. Being a quick, simple test it warns of changes taking place that otherwise might not be caught until much later.

Green Strength and Plasticity—The green working strength of a sand is comprised of two properties. They require separate tests and separate control. The load-carrying ability is defined by compression, shear, or tensile tests. The plasticity or strain under load is measured as green deformation. Deformation is most easily measured during a compression test. Green compression times green deformation equals toughness, and this figure has been used to advantage in some quarters as a control figure.

It is better to control strength and plasticity independently, using amount and kinds of clay to regulate strength and using moisture, cereal and kinds of clay to regulate plasticity. This is the secret of success in using the new higher green strengths of 12—18 psi for faster molding and more accurate castings with lower dirt loss. Clay and moisture are chosen and controlled to keep defor-

TABLE I—Suggested Sand Control Limits

Property	Range (plus or minus)	Example
Moisture	0.2%	3.8 — 4.2%
Green permeability	10%	63 — 77
Green compression	1 psi	13 — 15 psi
Air set strength	5 psi	20 — 30 psi
Dry compression	20 psi	80 — 120 psi
Hot strength	20 psi	60 — 100 psi
Grain fineness (AFS No.)	2	76 — 80 AFS
Per cent on each screen	10%	18 — 22%

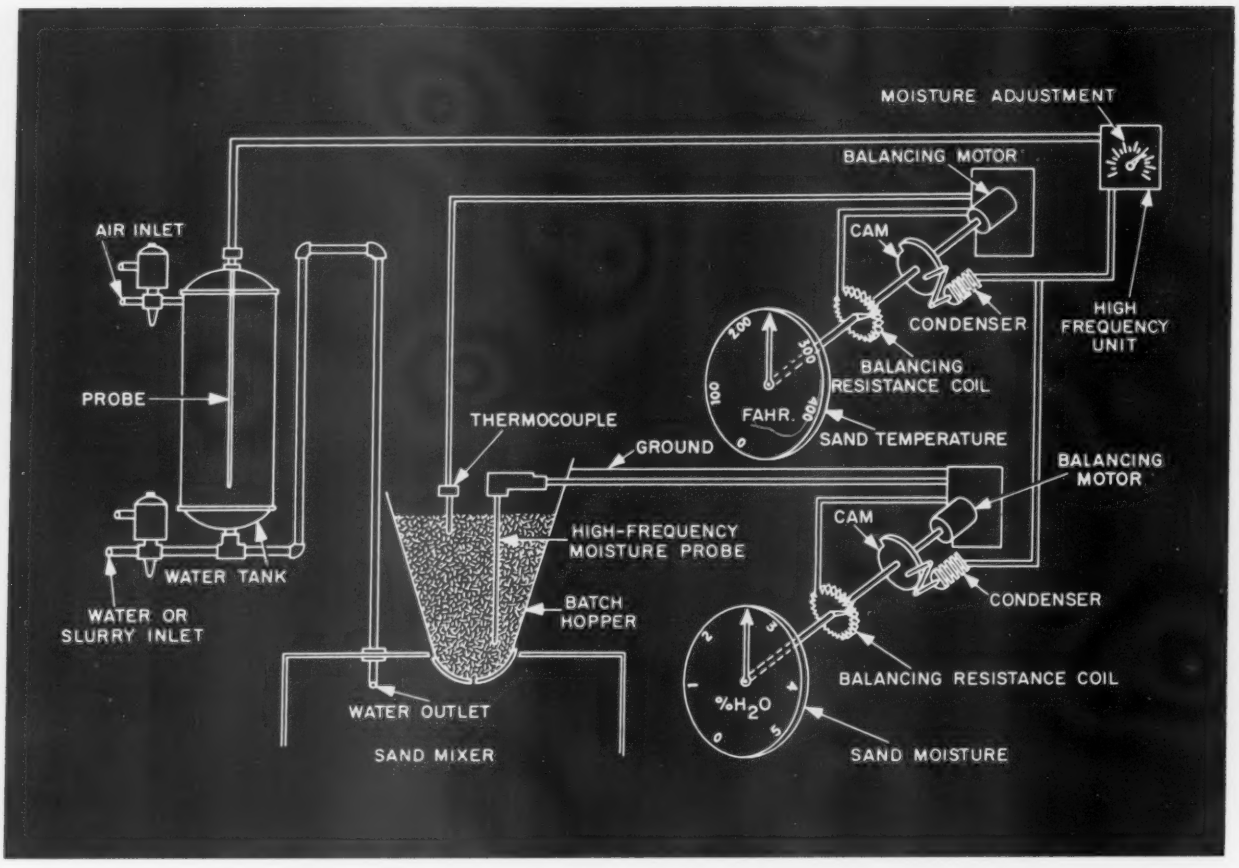


Fig. 5—Diagram shows operation of system of automatic devices to control moisture to required degree without hand feel or personal judgment

mation and flowability in line. A green deformation of 0.015 to 0.020-in. is ideal for green sand in gray iron, malleable and nonferrous practice. The mulling cycle is a part of the sand mixture and must be held just as closely as the clay percentage.

Green deformation also bears on mold wall stability. Other things being equal, the higher the deformation, the larger the over-all dimension of the casting and the more the apparent piping or shrinkage. This becomes apparent when one considers that the mold wall will yield under molten metal pressure according to its stress-strain characteristics. Fig. 2 shows a typical strength-deformation curve for molding sands of high and low shrinkage characteristics.

Air Set and Dry Strength—Starting with the green sand condition, there must be adequate strength at all times to resist erosion of flowing metal. In the green state and also above 2000°F there is sufficient tackiness or plasticity so that the strength in pounds need not be so high. In the air dried, heat dried, and heated condition the sand mass is relatively brittle and must rely chiefly on pounds of strength alone. Thus air-set strength should be 20 psi minimum as determined on a 2 x 2-in. specimen air dried 4 hr. Low air-set strength often is associated with blown-away mold edges. Dry strength also should be kept over 20 psi and preferably between 50 and 100 psi. Dirt losses and dry strength can be shown to be related. Either too low or too high dry strength reflects a poor sand condition leading to excess dirt.

Hot Strength—The compressive strength at 500° F, 1000°F, 1500°F and 2000°F must be above 20 psi and preferably above 50 psi. These figures apply to green sand molding for gray iron, malleable, and nonferrous work. Dry sand work and steel can and usually do carry higher strength values. At 2500°F it is difficult to maintain over 10 psi, which is sufficient in this plastic range. Here again the best range of hot strength is the one giving the best castings.

Retained Strength—The effort necessary to separate flask and casting from the sand is dependent on how hard and strong the sand is after having been heated and then cooled. This strength can be simulated and measured in the dilatometer by heating 1⅛ x 2-in. specimens to 800°F for 12 minutes and cooling before breaking. The lower this strength is kept the better, without sacrificing ease of molding or casting quality.

Frequency of Test—How often should sand tests be made? The basic rule is to test each property often enough to reveal trends which are within limits, rather than allowing the property to go out of control.

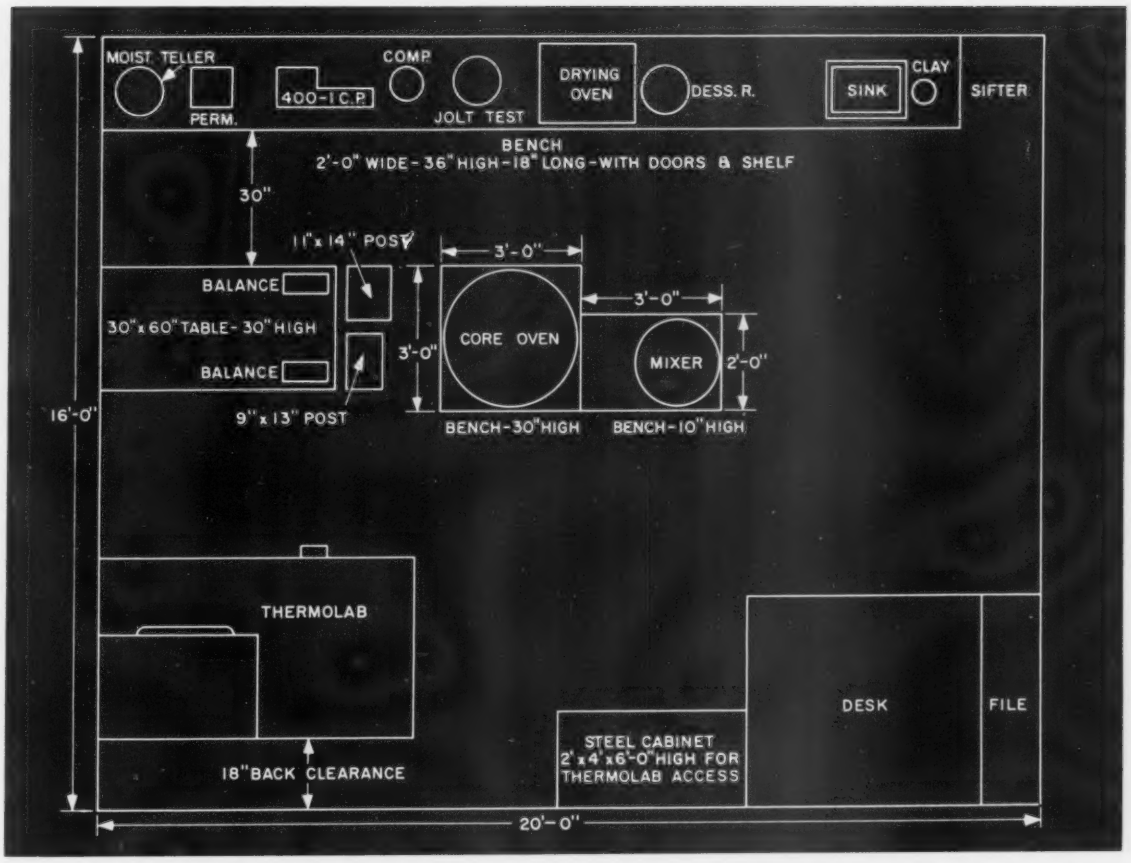


Fig. 6—Motion study can simplify task of routine control testing. A layout like this one will give more tests per day without extra effort

Two extremes of actual test schedules will illustrate the point; most foundries are somewhere in between:

Large Synthetic Sand System	Small Floor Jobbing Shop
Moisture, 15 minutes*	4 Tests per day per heap*
Green compression, 1 hour	1 Test per day per heap
Green deformation, 1 hour	1 Test per day per heap
Dry compression, once a shift	Once a week
Air set, once a shift	Once a week
Screen and clay, once a day	Once a week
Hot properties, once a day	Once a month**

*Once or twice a day where automatic sand tempering is used.
**Send out to commercial laboratory if not equipped.

Laboratory Layout—The task of routine control testing is much easier where some thought is given to motion study resulting in a layout which will also give more tests per day with no extra effort.

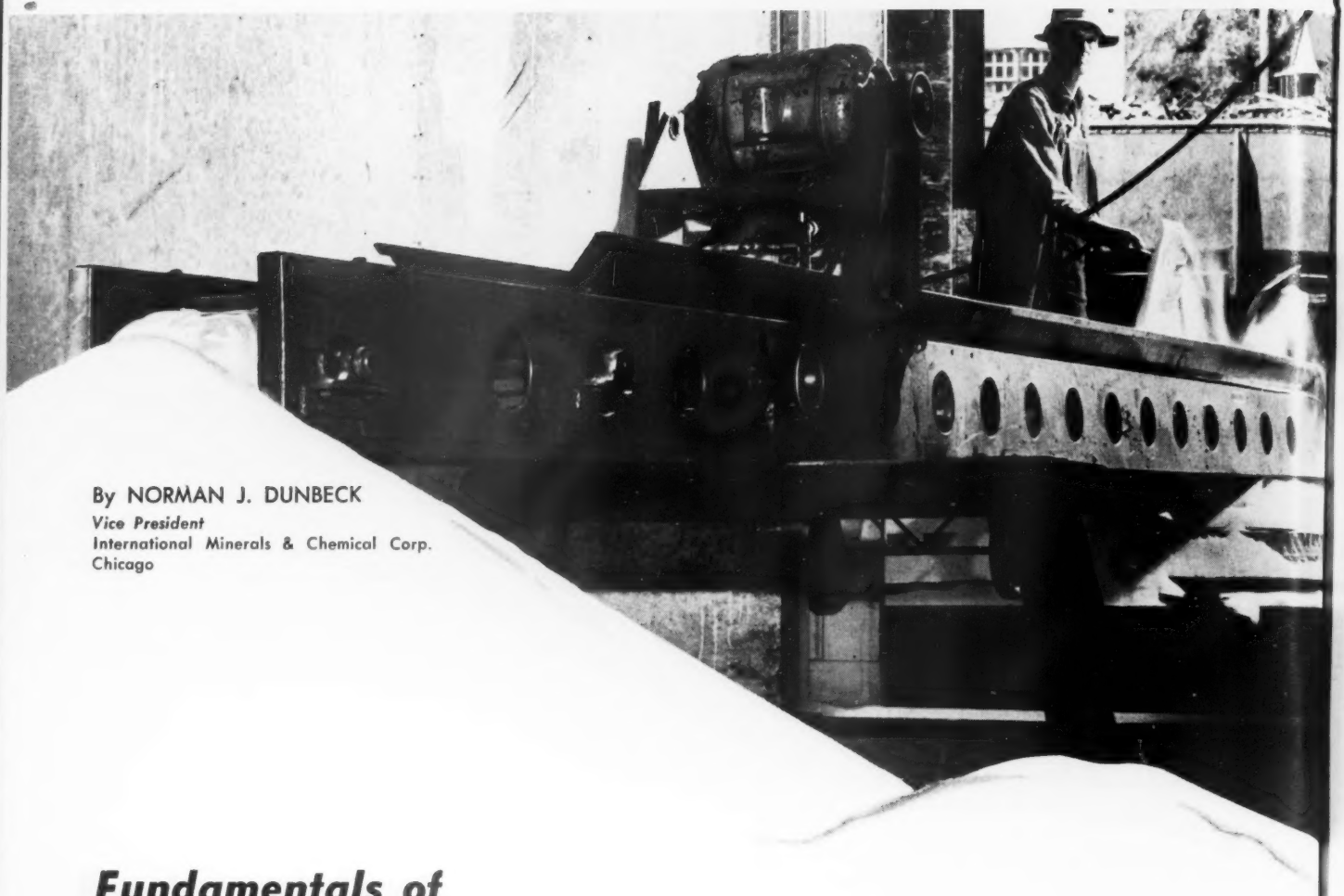
A time saving layout is shown in Fig. 6. The essential feature is a 30-in.-high table where samples are riddled before testing and weighed out. The rammer is independently mounted beside the table. Just 30 in. behind the table is a 24-in.-wide by 36-in.-high bench with the moisture teller, permeability meter and strength machine on it. Both green molding and green core tests may be made in this setup. It is best, however, to have a separate strength machine set up for baked tensile or transverse tests, to avoid too much lost time in changing accessories.

For inexpensive storage of sharp, bank or testing sand, the well-known corrugated can placed on casters is very convenient since it can be pushed out of the way under a table. Cut down 55-gal drums serve the same purpose.

Binder Testing—The writer is a great believer in testing binders in the actual batch they are to be used in and testing only for those things that bear directly on their foundry use. Thus, tests on a core oil should be made against a reference sample in the actual shop type batch for hardness, baked tensile strength, gas, bakeability, etc., rather than for chemical analysis. Another practice which often helps is to keep a sample of each shipment of binder or additive for six months or more for possible future testing.

Then, when any question arises, one can make up test batches substituting one reference material in each batch in an effort to pin down difficulties.

Conclusion—Sand control is one of the necessary tools we use to make castings that will satisfy today's needs. It is also a lot like the old-fashioned hand saw; you have to put some push behind it to get results, and the more you use it, the closer you can come to the mark.



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Fundamentals of

SYNTHETIC MOLDING SAND

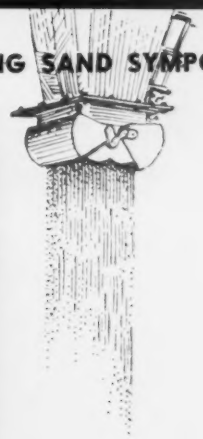
In synthetic sand practice, almost any sand property can be achieved and maintained with correct combinations of sand, bond and additives. Avoid carrying over theories about natural sand which no longer apply

SYNTHETIC sand practice is so well established today that many foundrymen forget that it is a relatively recent development. Only 25 years ago, synthetic sand was unknown to a large percentage of operating foundrymen. At present almost any sand property may be achieved and maintained by correct combinations of sand, bond and additives.

Recent developments in synthetic sand are important, but a review of the fundamentals may facilitate better use of these improvements. Some misunderstandings concerning synthetic sand stem from the fact that this sand practice is partially an outgrowth of natural sand molding practice. Some of the theories concerning the use of natural sand have been carried over into synthetic sand practice, although they no longer apply.

To obtain maximum efficiency from synthetic sand we need an understanding of the effect of the characteristics of the base sands and the bonding clays. Subsequent control should be built on a foundation of good synthetic sand practice. There is no economy in trying to "doctor" a fundamentally incorrect sand. If sand practice is basically sound, subsequent refinements can make a good sand better. It is not sound practice to add "medicine" to make a poor sand workable.

Looking Back — To understand better some of the problems which occur in synthetic sand practice, we might look back to the first attempts to make synthetic sand. The original synthetic or rebonded sands started with a natural sand base to which clay was added for the purpose of reviving the strength. It was assumed that since some of the clay had been burned out of the sand, replacing that clay would revive or rejuvenate the



Portable power conveyor for handling bulk materials up to 14-in. top size is being used to unload foundry sand from a boxcar into a shed

New sand is being dumped from a boxcar into a track hopper. A feeder below hopper delivers sand to conveyor

sand. It further was assumed that if a more nearly pure, more refractory and more durable clay was used, the sand would be improved. This result was demonstrated. It then developed that in some instances make-up sand had to be added to maintain volume, whereas in others burned core sand fell into the shakeout sand in adequate volume.

Although it now seems obvious, it took a little time to realize that the naturally bonded sand originally present was replaced quickly and that we were dealing with new molding materials. This led to the further logical thought that the user need not attempt to duplicate naturally bonded sands, but could compound sands to fit best his particular work. This idea led to study of base sands which were available and to the production, over a period of years, of several types of bonding clays, special binding agents and special sand additives. As these changes took place, instead of the molder's adjusting himself to the sand, it became possible to make in the foundry a sand that would fit the equipment and the casting to be made.

How Sands Differ—The principal differences between naturally bonded and synthetic sand are as follows: The user had to attempt to find within economical limits a naturally bonded sand which came closest to meeting the requirements of his work. When using the sand, he discarded it and added new sand principally for the strength it contributed. With synthetic sand, the user compounds various materials to make a sand or sands which specifically fit his work. New strength is added in a concentrated form as a clay binder.

In either naturally bonded or synthetic sand, the bonding action takes place partly by adherence between adjacent grains, but principally because the bonding clay and silt is forced between grains to form a mechanical wedge or lock.

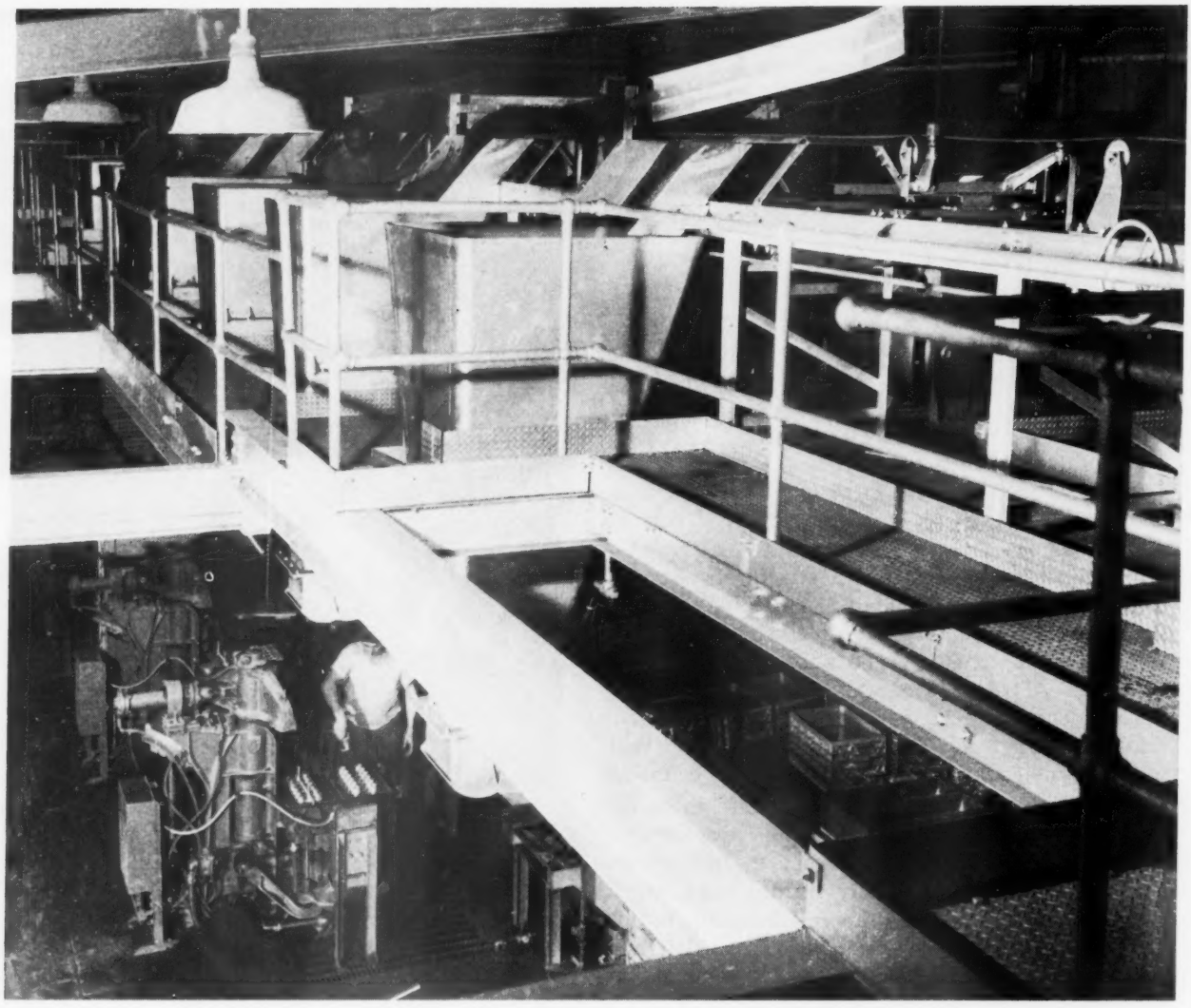
Most naturally bonded sands contain a rather high percentage of inert silt as well as clay, and the total of both may be 20 or 25 per cent. In synthetic sand, little silt is present, and the clay content may be between 5 and 10 per cent. With the naturally bonded sands it usually is necessary to have a coarser grain for equal permeability because of the amount of fine material present. Because there was less filler in the synthetic sands, some difficulties were experienced due to scabs and rattails. It then was found that the early recommendations of a sand highly uniform in grain size were incorrect and that better results were obtained when the base sand or sands were spread over four, five or more screens.

Many foundrymen who used naturally bonded sands feared high mold hardnesses because of blows and scabs as a result of the combination of low permeability and high moisture. Many foundrymen who used synthetic sand also feared hard ramming because of rattails and buckles resulting from too high expansion. Present practice is a combination of low moisture and hard ramming in synthetic sands; the expansion is taken care of by a spread in grain distribution plus the addition of cellulose materials when necessary.

Properties of Base Sands—The user has some interest in the shape of the sand grain, its hardness, its refractory value and its freedom from impurities. However, the principal concern is with grain size and distribution. Distribution is important to the quality of casting produced, and grain size determines permeability. Sands sometimes are used because they are locally available at low cost and because the defects in such sands can be cured by the use of sand additives. Thought should be given to whether a more expensive sand may not justify its cost in terms of the final cost of the casting produced.

Most of the synthetic sands used today are more permeable than they need be. Part of this condition is a carryover from the days when high permeability was necessary in naturally bonded sands, and part is a carryover from the enthusiasm for high permeabilities which existed in the early 1930's. It sometimes is not yet appreciated that synthetic sands operate at about one-half the moisture content of the naturally bonded sands and need correspondingly less permeability to dissipate the lesser quantity of gas which is produced.

The finer sands have the further advantage that they dry out more slowly than coarser grained sands. Synthetic sands always dry out more rapidly than naturally bonded sands, but most of this



Molding sand moves along a conveyor belt as shown at top right of photo and is diverted into hoppers for individual molding machines as it is required

difficulty has been overcome by better methods of handling and storage. Also, it sometimes is not appreciated that operating conditions are much more severe for present day synthetic sands than they were for naturally bonded sands some years ago. Present sands are used and reused very rapidly and operate at temperatures far above those of previous years. High strength combined with high flowability is possible in synthetic sand, regardless of base grain chosen. Great flexibility is possible in making a sand when base sand and bonding agent are selected independently of each other.

Properties of Clays—The word "clay" as used in the foundry covers a variety of materials which contribute widely different properties to sand. The bonding clays principally used are fire clays and southern and western bentonites. The southern and western bentonites from the recognized producing areas generally are similar in properties. The term "fire clay," on the other hand, covers materials which may range from 30 to 75 per cent true clay. Such clays may differ in refractory value by as much as 700° F. The phrase "fire clay" therefore is rather indefinite, but will be used here to indicate the strongest of such clays available to foundrymen.

The fire clay binder was the original bond clay used in rebonding sand or in the preparation of synthetic sand. When fire clay binders are used, the synthetic sand which is produced probably comes closest to the properties of a naturally bonded sand since its strength is such as to require the use of twice as much clay in the sand to develop a given strength as would be required with bentonites. This type of clay is low in first cost and has high durability.

Fire clay bonded sands show less rapid change in properties in use than bentonite bonded sands. The high durability of the fire clay results in low total costs. Permeability is lower than when stronger bonds are used, but this is sometimes helpful where an available sand of low cost has higher permeability than is desired. Because of the cushioning effect of the volume of fire clay that is present, it is somewhat easier to use when

sand grain distribution is not exactly what is desired. This type of clay is used rather widely in the Midwest, where combinations of low cost lake and bank sands are popular. Because of its durability and medium dry strength, it often is used as a base for combinations of clays.

Since western bentonite is about twice as strong as a fire clay bond, less clay and less moisture may be used. Its most important property is its unusually high dry strength and hot strength. This makes the clay particularly adaptable for use in steel sands or in sands for relatively large gray iron and nonferrous castings. Even higher hot strengths are obtained when western bentonite is combined with fire clay since the two develop a complementary action which provides a sand with a higher hot strength than is available from either clay used alone. Western bentonite is the least flowable of the bonding clays, but, as a result, develops excellent deformation properties.

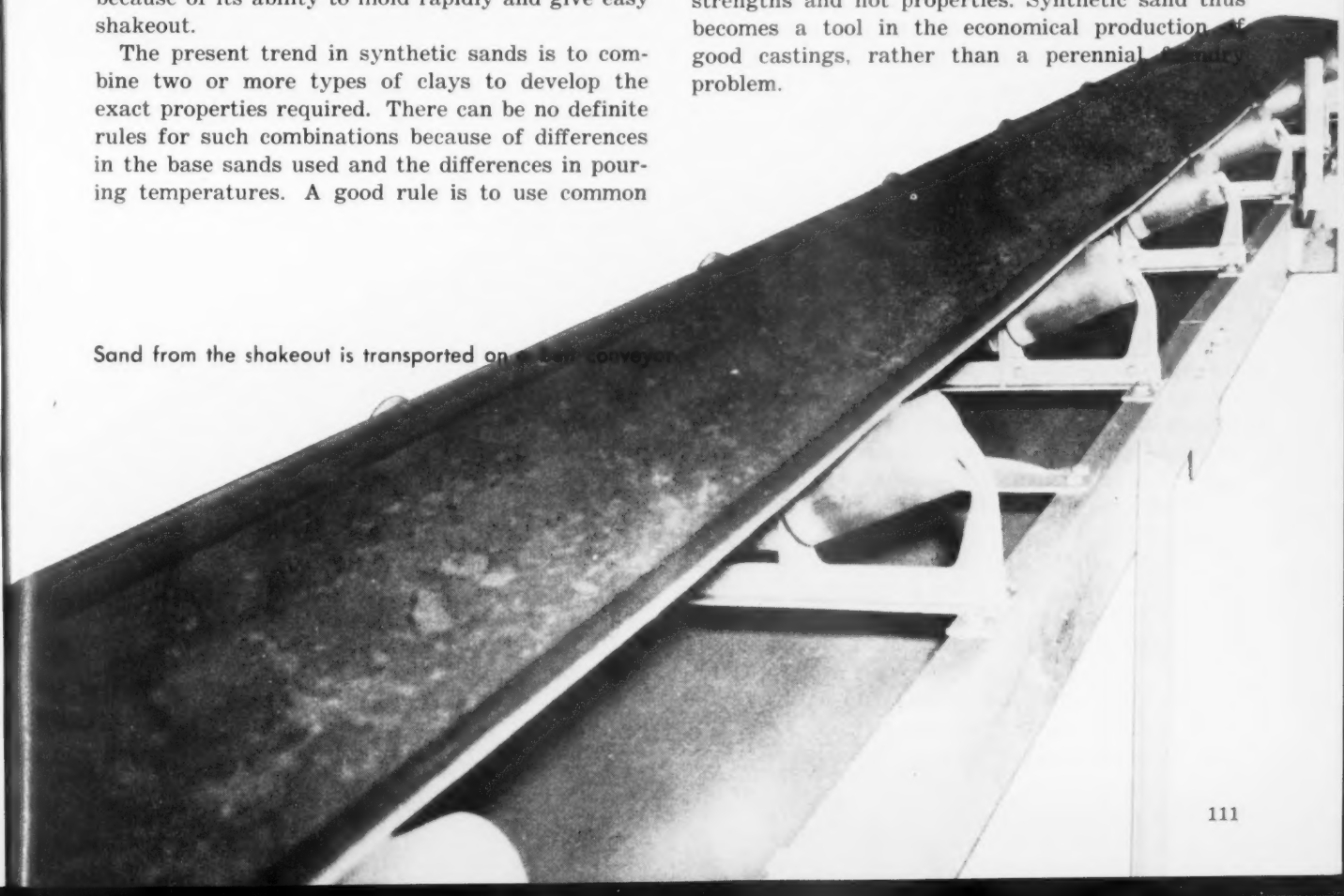
Southern bentonite, although similar in mineral composition to western bentonite, is quite different in its working characteristics. It is higher in green strength than Western bentonite. This additional strength is somewhat offset, however, by the lower durability of the clay; in actual use the consumptions are comparable. The distinctive features of southern bentonite are high flowability and low dry strength. This type of bonding clay permits the development of sands with maximum flowability combined with high permeability and easy shakeout. When used alone, it normally is confined to light gray iron and malleable or nonferrous work because the low dry strength could lead to cuts and washes in heavier work. This clay has found particular application in high production operations because of its ability to mold rapidly and give easy shakeout.

The present trend in synthetic sands is to combine two or more types of clays to develop the exact properties required. There can be no definite rules for such combinations because of differences in the base sands used and the differences in pouring temperatures. A good rule is to use common sense. If fire clay is preferred for various reasons but permeability is on the low side, keep one-half the fire clay in the mix and replace the eliminated half with 50 per cent less southern bentonite on light work or make a similar substitution of western bentonite on heavy work.

If southern bentonite gives you fastest molding and easiest shakeout, but you have some cuts and washes, gradually replace part of the southern bentonite with western bentonite until dry strength is raised to where you just eliminate the washes and no more. Any further increase in dry strength will give more difficult shakeout with no compensating advantage.

A point frequently overlooked by the user is that more clay means more water in the sand mix. If too much clay is added, more water is unavoidable. Costs are higher than necessary, and the high moisture is undesirable. In many sands, strength would remain the same and the sand would be more workable if both clay and water were reduced. Many users add water until a sand feels right. If the water addition was fixed and the clay addition was variable, better and cheaper sand would be produced.

Summary — Synthetic sands have the distinct advantage of versatility. They permit the foundryman to develop and maintain a sand with the combination of properties required for a given job. Synthetic sand practice is inexpensive because only that portion of the sand which is lost needs to be replaced. Synthetic sand control is relatively simple and is based on proper sand distribution, the choice of the correct clay, or combinations of clays, and the maintenance of the proper level of clay and moisture to develop the desired dry strengths and hot properties. Synthetic sand thus becomes a tool in the economical production of good castings, rather than a perennial foundry problem.



Sand from the shakeout is transported on a belt conveyor.

NATURALLY BONDED MOLDING SAND

Naturally bonded sands are preferred and are almost necessary when sand handling and mulling equipment is limited or nonexistent. These sands can be conditioned by any recognized method, either manual or mechanical

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ALTHOUGH there is a definite trend toward so-called synthetic, or compounded or formulated, sands, many foundries do or should use naturally bonded sands. The purpose of this article is to describe the part these naturally bonded sands play in the molding process.

Natural sands are preferred and are almost necessary when sand handling and mulling equipment is limited or nonexistent. Although good sand control practices make naturally bonded sands superior in character, they also work well with a minimum of control. Natural sands obviously are controlled easily since water often is the only addition made. For many light castings, no facing material or additional bond is necessary with some of the natural sands.

Natural sands may be conditioned by any recognized methods, such as cutting by shovel or mobile floor machine or by more elaborate mulling and conditioning equipment. With naturally bonded sands, testing equipment, conditioning units and control personnel can be minimized.

Moisture Content—A factor which undoubtedly influences the preference for natural sands in jobbing and "floor" foundries, is their wide moisture range. Many of these sands can be worked with as much as a 4 per cent range. Such a sand could be worked at 8 per cent moisture without being too wet and at 4 per cent moisture without being too dry. The high content and nature of the bonding materials in natural sands gives them this flexibility.

Natural sands offer resistance to drying out when they are exposed for long periods of time. This advantage is of most importance in the many shops which condition their sand at night and place it in "heaps" or windrows for use the following day. Again, the amount and nature of the bond greatly influence this property.

Another advantage, based on moisture range and bonding material present, is the ease with which naturally bonded sand molds can be patched and finished. This is of most importance, of course, in foundries doing extremely large work and those using loose patterns.

There is a trend to some extent toward so-called semi-synthetic sands, in which some naturally bonded sands are used in conjunction with those of a clay-free nature in order to obtain some of the advantages of natural sands. The hot sand problem encountered in many shops can be alleviated to some degree by the use of these semi-synthetic mixes.

The fact that naturally bonded sands do not segregate during shipment, while unloading or in storage can be considered another advantage. These sands usually are just as uniform when used as when shipped.

Perhaps another outstanding advantage of naturally bonded sands is their inherent resistance to expansion defects. They contain their own cushioning material or filler and thus have comparatively little tendency toward such defects as rat-tails, buckles and scabs. Ordinarily, natural sands have a wide grain distribution, and the grains are sub-angular. These are additional properties generally considered desirable in molding sands.

Bond Additives—Common practice is to add new natural sand to the system or to heaps in quantities sufficient to keep the strength at a given level. If additional strength is needed for special jobs, common bonding materials such as bentonites and fireclays are used successfully. These additional bonding materials can be added to the heaps and cut in, or they can be mulled with the sand.

Clay balls sometimes have been a problem, but they can be eliminated by use of sands with a minimum of inert fines. Clay balls usually occur only in the very fine grades of natural sands and then only when excessive amounts of fines which

View shows natural sand deposits north of Albany, N. Y.

are not true clay are present.

In order to prevent clay balls when finer grades of natural sands are used in a mechanized unit, it is strongly suggested that the clay and the inert fines be kept at a minimum. For example, Albany sand will give no trouble if it contains 9-12 per cent true clay, but much trouble may be encountered with the so-called 18-22 per cent clay content sand.

Supplies Still Ample—Within the last few years a false impression has developed that supplies of good natural sands have become depleted and that those produced now are inferior to those of years ago. Actually, natural sands produced by the many reliable sand companies are at the present time better than ever before, and the supply of these better sands is nowhere near exhausted. In fact, with new deposits being opened regularly and methods of production improving continually, the supply of better natural sands appears unlimited.

As the requirements and specifications of foundrymen have become more exacting, sand producers have improved their processing methods and controls so that a steady supply of excellent naturally bonded sands can be obtained in accordance with reasonable specifications of the buyers. Reasonable tolerances must be given since a natural product is being considered. To maintain this reasonable uniformity in naturally bonded sands, the producer must have experience, know its deposits and watch digging operations closely.

It is true that certain areas are depleted of sand as time passes, but new deposits of the same type then are opened in adjacent areas. A good example is Albany sands, which come from deposits which were inaccessible years ago, but now can be reached and worked easily because of modern means of production and transportation. This depletion of certain pits and opening of new ones also occurs with silica sands.

Following are some of the well known naturally bonded sands and the general locations in which they are produced: Tennessee sands, southwestern Tennessee; Albany sands, eastern New York; Gallia red sands, southeastern Ohio; Dorchester and Millville sands, southern New Jersey; Conneaut sands, northeastern Ohio; Zanesville sands, central Ohio; Lex sands, central Ohio; Sandusky sands, northwestern Ohio. Additional deposits are in Illinois, Iowa, Wisconsin, Indiana and other states.

Albany Sands—Albany sand deposits extend over hundreds of square miles adjacent to the Hudson and Mohawk Rivers. There are as many as a hundred loading points in this vast area. Long before a deposit is to be dug, it is thoroughly investigated as to the grade or grades available and the extent and depth of the vein. The Albany sands occur in sharply defined veins 18-20 in. thick. These veins differ so much in appearance and color from the topsoil above and the sharp sand or clay below that it is relatively simple for experienced workmen to obtain a very closely controlled product.

Too often foundrymen ask for Albany sand with extremely high clay content (18-22 per cent). To obtain this sand, producers must include some of the clay which occurs under the distinct vein of high quality sand. This clay differs from that which occurs in the sand vein itself, and the properties of such a blend are not typical of "true" Albany sand. Admittedly the "true" Albany sands (containing about 9-12 per cent clay) are relatively low in strength, but for most work this quality presents no problem. Some foundries have asked for "fortified" Albany sands, but it appears to be impracticable because of the widely separated, large number of loading points.

Albany sands are produced in a large number of well defined grades and, because of demands of users, producers also have had to make up blends to meet unusual specifications. The high clay (18-22 per cent) blend mentioned above is a typical example of variation from the standard or basic grades. It frequently is necessary to mine or dig the sand from several different banks and blend them together in definite ratios to make the desired blend.

Albany sands can be obtained in finenesses from about 220 down to about 50 and with clay ranging from about 6 to 22 per cent. Any given location usually contains acres of each grade that occurs in the area, and experienced supervisors clearly mark where one grade stops and another begins.

New Jersey Sands—Another type of natural sand comes from southern New Jersey. These sands were deposited by rivers and are found above the silica sands of that same area, on higher ground. The bonding materials in these natural sands must have been deposited at about the same time as the basic grains. Clay bearing material from the glacial streams undoubtedly was carried by rivers and deposited with the grains.

In addition to actual clay, these New Jersey natural sands contain a high percentage of hydrated iron oxide, which also acts as a bonding medium. The gravels and molding sands from this area are made up of high purity (about 99 per cent silica), sub-angular quartz grains with a coating of colloidal bond. They have unusually high green and dry strengths, both being high in proportion to the amount of clay substance. They are suited ideally for medium and heavy castings in nonferrous, gray iron and malleable. Of course, the heaviest castings are made in the coarser grades, and finer grades are used as casting section size decreases.

The natural sands of southern New Jersey cover thousands of acres and occur in deposits 8 to 14 ft thick under from 1 to 4 ft of topsoil. There are 11 quite distinct grades in this area, ranging from 20 fineness up to about 110. Each grade is found in large quantities distinctly separate from any other grade. This makes control of final product simple because there is a spread of only 10 points in fineness number in each grade. Each grade also occurs in three quite distinct clay contents.

For example, in a typical 14-ft deposit the top few feet contain 12-15 per cent clay, the middle few feet contain 15-18 per cent clay, and the bottom few feet contain 18-22 per cent clay. This is the way nature deposited it. With this variation in clay content there is not, however, any difference in fineness number from the top to the bottom of the deposit. Since each of the 11 grades occurs in three clay contents, there is a range of 33 distinct naturally bonded sands from this one district.

Typical Uses of Natural Sands—The finest grade of Albany sand (average 220 AFS fineness number) is used for extremely light and intricate nonferrous work such as artistic plaques and ornamental work. The next grade (average 200) is used on very light gray iron and malleable and on slightly heavier nonferrous. Such items as keys, locks, and small hardware may be included here.

The next grade (average about 175) is used for such products as soil pipe, stove plate, fittings and general light squeezer work. The next two grades (average about 145 and 115, respectively) may be considered together for use on light ferrous floor work, sanitary and enamel ware, and heavier nonferrous. The coarser grades of Albany and the finer grades of Dorchester can be grouped. They are used in facings for heavier green sand and skin-dried floor work.

Three grades of Dorchester molding sand (50, 60, and 70 AFS fineness) may be grouped for use for heaviest green sand and for some skin-dried and dry sand work. They are used in facings for such jobs as manhole and sewer castings, machine tools, marine and railroad heavy work, and some heavy nonferrous. Coarse grades, known as Millville or Dorchester gravels, are used for extremely heavy dry sand work. Typical castings are ingot molds, roll cores and necks, large machine tools, diesel engine castings, turbine housings and even such nonferrous castings as ship propellers.

The finer grades of Albany sands, used on the light and thin-type castings mentioned above, are used as they come to the foundry rather than as facings. No additives are necessary, yet smooth, clean castings are produced. The answer to the exceptionally good "peel" and finish of castings produced in these sands just as they occur in nature may be found in the low sintering point and high fusion point of Albany sands. The low sintering point makes these sands ideal for light, thin castings. As casting section sizes increase, however, additions of such materials as seacoal are necessary in facings made of the coarser grades of these sands to counteract the low sintering point and avoid burn-on and penetration.

Natural Sands of Mid-America

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NATURALLY bonded molding sands are found in large quantities in Ohio, Indiana, Tennessee and, to some extent, Arkansas, Missouri, Kansas, Minnesota, Mississippi, Alabama and Illinois.

At the turn of the century many iron and nonferrous foundries leaned heavily toward the deposits of sands from Ohio. Later, as the casting industry moved westward, sands were mined in Indiana and Illinois. About 1928 production of sands in Tennessee became quite extensive, and from these deposits production has continued to grow until today more sands are produced in the Tennessee district than all the other states in the mid-continent combined.

Sands from this district range from the fine stove-plate variety to the molding gravel range of finenesses. Their uniformity and high molding qualities have led to their use in extensive areas of North America.

These sands have the inherent characteristic of moisture retention, good flowability and high density. Naturally bonded sands can be had in almost any conceivable variety of grain distribution. They carry a clay content from practically nil to the high range of 30 per cent, and nature has evenly coated and blended the sand grains with clay. The clay of most naturally bonded sands provides a medium bond, a bond which enables a satisfactory clay ratio to be maintained in the system or sand heaps.

Clay Content Maintenance — Clay content of these foundry molding sands should be maintained at 10 to 15 per cent to provide ample durability and good working properties. This high clay content provides more material in which moisture can be absorbed and maintained. It reduces thermal expansion, for it has a large volume shrinkage when heated, thus counteracting or absorbing expansion of the silica grains.

Another advantage of naturally bonded molding

sands is the sharpness of pattern parting lines produced. Elasticity of these sands throughout the range of work and temper moisture permits clean pattern draws. In production work pattern plates remain clean and free of sand and smooth casting surfaces are obtained.

Many grades of naturally bonded molding sands may be used directly over the pattern, and quality castings are produced without the use of special facings. Also, natural sands normally do not require additions of seacoal, wood flour and stabilizers to make them work.

Users of these sands include iron foundries producing sanitary ware, machinery castings, soil pipe, soil pipe fittings and pressure pipe as well as nonferrous foundries casting brass, bronze and aluminum. The reasons why they have continued to use naturally bonded sands are that they provide an inexpensive sand mixture and one which produces a smooth finish with a minimum amount of sand maintenance and control.

Additions to the System—In mechanized shops where a mechanical shakeout is used for handling castings in large numbers, core sand becomes mixed with the molding sand. Core sand usually lacks the desired grain distribution for the system. Consequently, foundrymen are finding it necessary to add new sand to the unit to correct for grain maldistribution of the core sand infiltration. Naturally bonded sands are well suited to this purpose.

Naturally bonded molding sand, when added to a synthetically bonded sand, imparts many of its advantages. And when these mixtures are rebonded with bentonite or fireclay, the natural sand retains its desirable characteristics.

In foundries where large quantities of core sand are added to the system sand a surplus of molding sand is developed. This accumulation of sand will be greater than the loss on castings and general losses from the unit. Many foundrymen cannot see the economics of discarding sand from the system. Others see it as a good practice because it permits addition of a corrective sand.

It has been shown that the grains of molding sand, when continuously rebonded, continuously baked in the molds, turned and put through the cycle many times, have a tendency toward compounding of sand grains. These grain aggregations can be broken up by adding naturally bonded sands and/or clay-free sands.

Since grain size controls casting finish, these compound grains are detrimental because they have the effect of increasing grain size of the molding sand. Grain distribution can be remedied by adding any type sand. If other properties need correction, such as moisture retention and higher density, naturally bonded sands should be added.

Selecting the Right Sand—In the production of small castings on squeezer machines, it is considered good practice to select a naturally bonded sand containing 10 to 15 per cent clay. The reason is that sands containing clay in excess of 15 per cent clay tend to form clay balls. At this point it is generally conceded that sands reach a saturation point of clay. Consideration should be given to proper clay content in the purchase of natural sands. For medium and heavy molding, clay in the new sand must be well above system or heap sand limits to maintain working properties.

For general jobbing and much of the loose pattern work only a naturally bonded sand will retain moisture for the period which molders require to make the mold. In making floor type castings when mold surfaces are to be coated, natural sands will absorb and hold a deep coating of liquid blacking because of the absorption or penetration of water in the natural clay. Dry blacking will adhere well to a naturally bonded molding sand because of its plastic surface.

In the production of heavy castings, naturally bonded molding sand will retain its moisture for the longer molding time required, will give good hot strength, good resiliency, and will ram close to the pattern. It resists ferrostatic pressures due to the high natural density, resulting in minimum metal penetration and overweight castings.

Every foundryman has his own ideas about what distribution, what clay content, what permeability and what strengths molding sands should have for use in his heaps or system. He can satisfy his needs with naturally bonded sands. Producers of these sands are equipped to combine and blend and mix several basic grades from their deposits to arrive at the grade specified by the foundryman.

Analyses and Properties of Natural Molding Sands from Various States

Properties	Tennessee	Tennessee	Indiana	Indiana	Alabama	Alabama	Ohio	Ohio	Illinois	Illinois
AFS Average Grain Fineness	134	48	275	74	102.2	85	148	59	244	89
Moisture	8.4	5.8	7.6	7.0	9.4	8.8	6.6	7.4	7.4	6.4
Permeability	16.7	440	5.3	85	47	44	20	185	6	63
Green Comp.	10.1	14.4	7.4	9.0	17.2	12.5	5.6	13.3	7.2	10.4
Dry Comp.	36	73	32	65	93	42	28	86	56	92.5
AFS Screen										
Retained on 6 Mesh	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Retained on 12 Mesh	.....	0.80%	.....	0.60%	.....	.....	.....	.....	.....	.....
Retained on 20 Mesh	.....	17.60%	.....	0.80%	0.4%	.....	.....	5.20%	.....	0.40%
Retained on 30 Mesh	.....	18.80%	.....	2.80%	0.8%	1.20%	0.20%	9.60%	.....	0.40%
Retained on 40 Mesh	.....	19.20%	0.40%	9.20%	2.8%	2.20%	0.40%	16.20%	.....	12.60%
Retained on 50 Mesh	.....	10.80%	0.80%	17.60%	9.6%	4.40%	1.00%	20.80%	0.40%	17.00%
Retained on 70 Mesh	1.60%	3.40%	1.20%	24.40%	15.6%	9.60%	2.40%	11.00%	1.40%	24.40%
Retained on 100 Mesh	4.00%	2.40%	1.00%	11.40%	14.8%	28.40%	7.00%	6.00%	5.00%	19.40%
Retained on 140 Mesh	23.60%	1.20%	1.40%	5.20%	9.8%	18.20%	20.40%	3.40%	7.20%	7.00%
Retained on 200 Mesh	37.00%	0.60%	2.40%	4.40%	6.4%	5.80%	31.60%	2.20%	8.00%	3.60%
Retained on 270 Mesh	5.00%	0.40%	4.80%	2.60%	3.2%	1.60%	12.60%	1.40%	6.20%	1.20%
Retained on Pan	3.60%	6.20%	63.60%	5.00%	8.4%	3.20%	10.20%	4.20%	60.40%	9.40%
Total Screen	74.80%	81.40%	75.60%	84.00%	71.8%	74.60%	85.80%	80.00%	88.60%	85.40%
CLAY	25.20%	18.60%	24.40%	16.00%	28.2%	25.40%	14.20%	20.00%	11.40%	14.60%
TOTAL	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %

Molding Sand Use in the

GRAY IRON FOUNDRY

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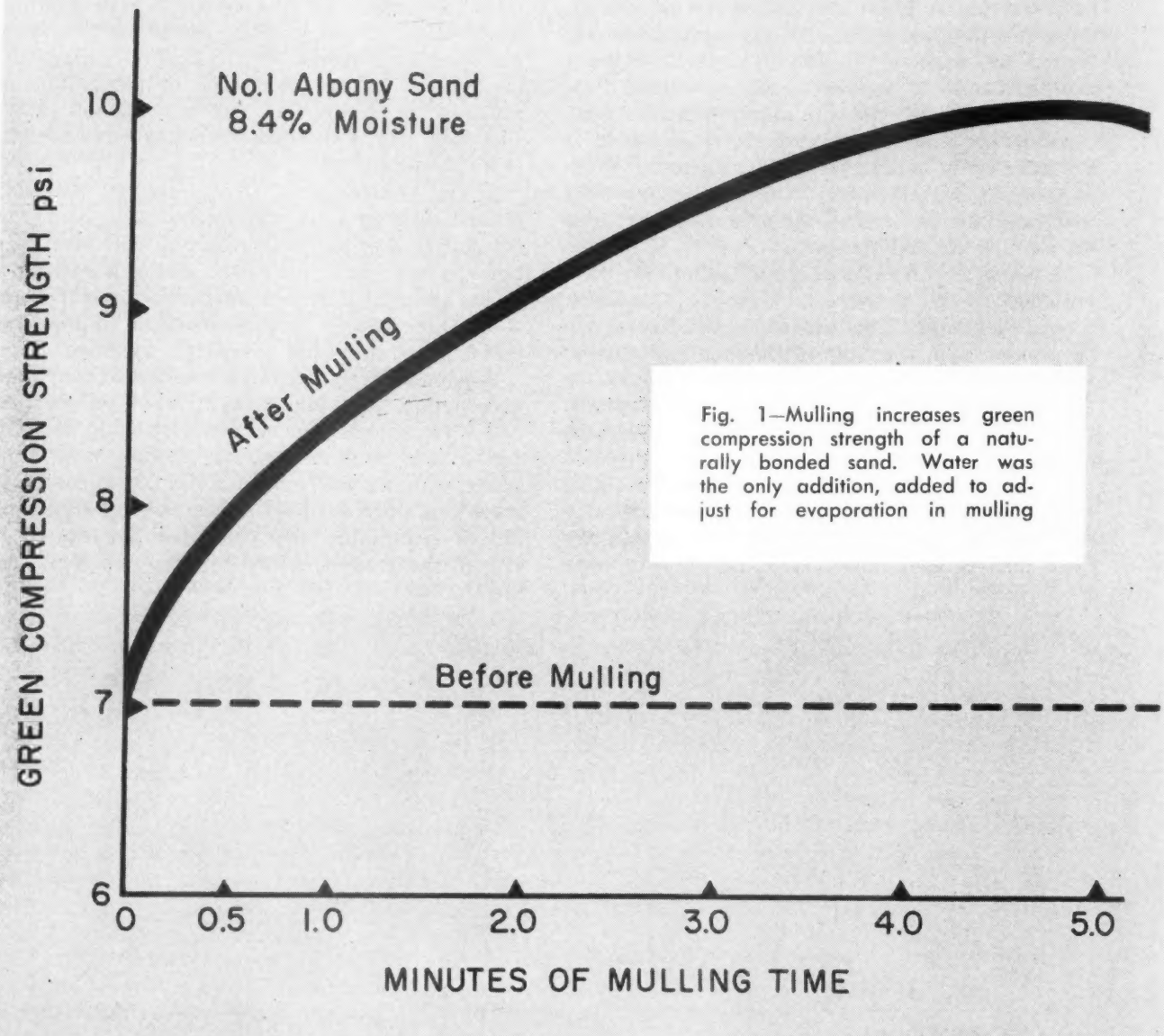
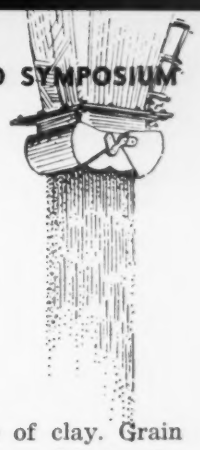


Fig. 1—Mulling increases green compression strength of a naturally bonded sand. Water was the only addition, added to adjust for evaporation in mulling



If we can gain a good understanding of our sands, learn where they come from and how they can be used best, then we can apply that knowledge in our own shops, with immediate results

HOW OFTEN in the last few months have you asked yourself, "What can I do to improve my product and so attract more business?" How often have you concluded, "Well, this is just a temporary situation and, like so many other problems in the foundry, it will soon clear up and work its way back to normal."

That view may have been correct in periods when things were going full blast. Today, however, it is necessary to look at each and every possibility in detail, and the sum total of what you do will make the difference between helping yourself or hanging yourself!

If you stop to think a moment to survey what means are available to make gray iron castings, you will find that it takes sand, metal, men and brains. It's what you do with those ingredients that makes the difference!

Half of our problem can be solved if we apply our brains to our sand practice. If we can gain a good understanding of our sands, learn where they come from and how they can be used best, then we can apply that knowledge in our own shops. The results will be immediate—higher quality and reduced costs.

The purpose of this paper is to provide some guides for a review of your own practice. Let us go back to fundamentals and deal specifically with the sand commonly referred to as naturally bonded and synthetic molding sands.

Naturally Bonded Molding Sand—Since the first gray iron castings were made, naturally bonded sands have been used. Much of the success of the foundry industry is due to the part nature had in engineering this material. Naturally bonded molding sand is available from many areas in a wide selection of grades.

Tables I and II are data tabulations of naturally bonded sands from two of the New York State areas. Table III shows the grades and physical data for a *mulled* naturally bonded molding sand from one of the New Jersey areas. As these tables indicate, a wide range of grain finenesses, permeability and clay substance is available. The degree of uniformity the shipper achieves in car-to-car shipments is well within the tolerance limits of the customer specifications. The consistently demonstrated ability of sand shippers to produce the sand specified is a development of their work at the sand pits, coupled with the test data of their laboratories.

Selection of Type or Grade—The choice of type or grade of naturally bonded molding sand depends on three major factors—grain size, grain distribution and amount and type of clay. Grain size and distribution are chiefly responsible for the type of surface finish on the resulting castings. Clay content is very important.[2] Type and amount of clay substance influence moisture content and to a large degree the expansion and contraction and refractory characteristics of the sand mixtures.[3]

As an initial guide for the selection of the grade of naturally bonded molding sand best suited to the types of jobs to be made, either the the AFS fineness number[4] or the green permeability number can be used. The following table lists the types of jobs in three categories. In jobbing shops, where a wide variety of castings are made using the same sand, it becomes necessary to consider the largest and heaviest castings; these castings will set the standards for the grade selected.

	Permeability	AFS Fineness No.
Small castings	15 to 40	100 to 180
Medium castings	30 to 80	80 to 120
Large castings	70 to 125	50 to 80

Green compression strength values, which are the means of measuring the internal and external factors of bond strength[5], also are an important guide to initial selection and day-to-day control.

Five to seven lb of green compression strength generally provide the greater amount of workability[6] with naturally bonded molding sands. Type and size of castings, different methods of molding, type of sand preparation, care used in performing the operation and the use of other materials such as sand additives, all alter the amount of green compression strength here prescribed.

Additions to maintain or increase green strength values can be made with naturally bonded sand with a higher percentage of clay or with bentonite Most sand shippers can supply an extra-strong or bonding sand containing 15 per cent or more clay substance. It may be scattered over the heaps and cut in, or mulled in where mulling equipment is available.

Fig. 1 shows the effectiveness that mulling can have in increasing the green compression strength values of a naturally bonded sand. The only addition to the sand was water which was added to compensate for moisture evaporation during mulling.

Either western bentonite (swelling type) or southern (non-swelling type) can be used to increase strength values. Southern bentonite is preferred when additions are made without mulling. With mulling, either type of bentonite is satisfac-

Table I—Grain Distribution and Physical Data*

(Naturally Bonded Sands)

Grade	Retained on Mesh No. 6	12	20	30	40	50	70	100	140	200	270	Pan	AFS Clay	AFS Grain Fineness	Perm.	Green Comp. Strength	Water
00	0	0	0	0	0	1.4	0.8	4.0	11.4	16.6	18.2	34.2	13.4	205	9	6.5	6.0
0	0	0	0.2	0.3	0.4	0.8	2.5	8.9	11.3	15.8	17.8	29.5	12.5	190	11	6.7	5.5
1	0	0	0	0.2	0.6	1.2	5.0	15.1	16.4	15.5	13.2	20.6	12.2	156	16	6.4	6.0
1.5	0	0	0	0.2	1.2	5.6	14.4	14.0	12.2	10.0	8.6	22.0	11.8	146	24	6.25	6.0
2	0	0	0	0.2	2.6	11.0	22.8	25.6	14.0	6.6	3.8	4.6	8.8	81	73	3.25	6.0
3	0.5	1.2	3.1	9.0	21.3	18.2	7.6	4.6	4.4	6.4	3.5	8.4	11.8	78	50	5.5	6.8
4	0	0	4.8	10.6	23.2	21.6	10.8	4.4	2.4	2.2	1.8	6.0	12.2	65	80	5.0	6.0

*By Permission of W. J. Dyer & Son, Jonesville, N. Y.

Table II—Grain Distribution and Physical Data*

(Naturally Bonded Sands)

Grade	Retained on Mesh No. 6	12	20	30	40	50	70	100	140	200	270	Pan	AFS Clay	AFS Grain Fineness	Perm.	Green Comp. Strength
1-M	0	0	0.04	0.02	0.04	0.54	4.32	13.74	23.52	19.80	6.22	15.36	16.40	146	12.6	7.3
1-S	0	0	0.04	0.08	0.16	1.06	3.52	11.28	20.56	20.08	3.46	22.02	17.74	160	9.7	6.8
Bonding	0	0	0.02	0.02	0.04	0.34	1.26	4.60	12.12	18.04	6.14	28.52	28.90	196	5.3	10.3

*By Permission of the Whitehead Bros. Co., New York

Table III—Mulled Naturally Bonded Molding Sands*

Grade	Retained on Mesh No. 6	12	20	30	40	50	70	100	140	200	270	Pan	AFS Fineness Number	AFS Clay	Green Strength	Green Perm.
1-150	0	0	0.2	0.3	0.8	2.7	7.0	10.5	17.8	20.9	9.3	14.6	145	16.0	10.1	24.2
													±10	±2	±2	±7
1-175	0	0	0.1	0.2	0.3	2.1	6.3	7.1	15.3	22.3	10.7	19.5	161	17.0	10.2	19.5
													±12	±2	±2	±5
2	0	0	0.2	0.3	0.8	5.7	19.3	20.6	17.2	11.0	3.7	6.2	100	15.5	10.5	58
													±8	±1.5	±1.5	±10
3	0	0	0.8	1.2	2.5	5.5	18.2	28.5	17.9	5.8	1.4	2.7	81	16.0	10.5	80
													±5	±1.5	±1.5	±10
4	0	0.2	2.0	2.8	5.5	13.5	24.4	25.0	9.3	2.5	1.2	1.0	64	15.0	9.0	126
													±5	±5	±1.5	±15

Tested at 7 per cent Moisture

*By Permission of the New Jersey Silica Sand Co., Millville, N. J.

tory. Western bentonite imparts higher dry compression strength values as desired.

The use of seacoal or other materials used as buffers is beneficial in controlling expansion difficulties. Although most of the naturally bonded molding sands inherently have this means of controlling expansion, the degree of control is not always sufficient. The amount of buffer materials that should be used depends on the type and quality of the sand to which they are added. Seacoal additions in the amounts of 1½ to 2 percent in naturally bonded sand promote a better peel on shaking out, thus reducing cleaning time. Because gas from the seacoal or other combustibles and vapor from the temper water are released on pouring, care must be taken to insure that additions are not excessive.

The future for naturally bonded molding sands is good. New sand preparation plants, to provide foundrymen with an aerated sand containing the correct amount of moisture for use on arrival, are in operation. Boxcar shipments of these sands eliminate complaints that sand is received either too dry or too wet. Huge storage sheds, blending equipment, conveyor transportation and many other facilities have been incorporated at the newer plants.

Synthetic Molding Sands—Of more recent origin to the foundry than the naturally bonded molding sands are the so-called synthetic sands.[1] Many controversies have arisen over the word "synthetic," and in its place the words "blended" or "compounded" are gradually gaining favor. The supply of top grade silica sands, the base for most synthetic sand mixtures, for foundry use is nearly inexhaustible. Because of the many deposits scattered throughout the U.S.A. and Canada, a selection of the proper grade of sand usually can be purchased nearby, thus reducing shipping costs.

Table IV is representative of a New Jersey sand operation where washing and classifying are part of the routine for precise grading.

It is interesting to note that this one operation offers a wide selection of AFS fineness numbers to choose from. The shipper of these sands states that a tolerance of plus or minus three points in the AFS fineness number is required.

Most sand shippers can furnish technical data on their products that aid in selecting the desired grade. Important in the selection of silica sand for any foundry use are the grain distribution, grain shape, kind and amount of impurities and silica content. In answer to the question of what makes one sand better than another, we could say that the sand with the least impurities and the hardest quartz grains will be the better, due to its increased refractoriness.

In recent years, since the advent of elevated temperature testing on foundry sand mixtures[4], it has been learned that hot strength values are increased when the base sand has a spread of 70 per cent on four or five adjacent sieves.[7]

Developing a Sand Mixture—It is fundamental

in the development of a molding sand mixture that the end results must produce sound castings free of surface defects. In order to achieve good results, certain basic factors which are common to every synthetic molding sand mixture must be observed. These factors, through the medium of sand testing, represent the measurable differences of the green and dry physical properties. Data provided by sand testing at room or elevated temperatures become the yardstick for both the initial development of a sand mixture[8] and the daily control in the foundry.[9]

Selecting the Base Sand—The following points should be considered in selecting base sands. As a rule, the finer the sand used, the smoother surface finish of the castings, the greater the total surface of the sand grain area and the lower the permeability of the sand. With some exceptions, the opposite is true when work is done with coarser grained sands.

The surface finish of castings may or may not be the factor controlling their sale.[10, 11] Whether or not good surface finish is a prerequisite, the standard, as set by the customer, is an initial factor for consideration in the selection of a base sand. The figures shown in Table V, covering a wide range of

Table IV—Washed and Classified Sands*

Grade	Retained on Mesh No. 6	12	20	30	40	50	70	100	140	200	270	Pan	AFS Fineness No.
A Special	0	0	6.8	14.0	23.2	31.6	18.6	5.4	0.4	0	0	0	37
A Special or AA	0	0	4.8	11.0	19.8	32.6	22.4	8.2	1.0	0.2	0	0	40
AA	0	0	3.4	9.6	18.6	26.0	29.6	12.0	0.8	0	0	0	42
AA or A	0	0	2.0	5.0	15.4	37.8	29.2	9.2	1.2	0.2	0	0	44
A	0	0	0.6	2.2	9.4	36.4	36.2	13.4	1.6	0.2	0	0	47
B	0	0	0.6	2.0	8.0	30.4	39.4	17.0	1.8	0.4	0.2	0.2	50
B	0	0	0	0.2	2.6	24.2	46.6	23.2	3.0	0.2	0	0	53
B or C	0	0	0	0.2	1.6	20.2	46.4	26.0	4.8	0.6	0.2	0	56
C	0	0	0	0.2	2.0	18.4	41.6	29.6	6.8	1.0	0.2	0.2	59
D	0	0	0	0	1.0	12.8	41.6	33.6	8.0	2.2	0.4	0.4	64
D	0	0	0	0	0.8	9.2	32.4	39.4	14.4	3.0	0.4	0.4	68
Special	0	0	0	0	0.2	5.4	30.0	41.8	16.0	4.6	1.0	1.0	74
Special	0	0	0	0	0.2	4.8	27.2	39.2	18.0	6.8	2.2	1.6	80
E	0	0	0	0	0.2	4.4	23.0	36.2	18.8	10.2	3.8	3.4	89
E	0	0	0	0	0.2	4.6	22.8	36.6	18.2	10.2	4.0	3.4	90
Special	0	0	0	0	0	2.6	11.6	36.0	26.4	12.8	4.6	6.0	103
Superior	0	0	0	0.2	0.4	0.6	5.4	17.8	26.0	22.4	11.2	15.0	141
Superior	0	0	0	0	0.2	1.8	4.6	11.2	22.4	25.6	14.0	20.2	158

*By Permission of the Whitehead Bros. Co., New York.

TABLE V—Workable Synthetic Sand Mixes in Relation to Casting Weight and Type of Molding

System or Heap Sand Castings Size	Weight	Type of Molding	AFS Fineness No. of Sand	Moisture %	Permeability	Comp. Strength Green	Comp. Strength Dry	Deformation	Sand Toughness Number*
Small to medium	1 oz to 30 lb	Hand ram Jolt squeeze Blowing	80–180	3.0–4.0	50– 80	8.0–10.0	50–125	14–20	130–160
Medium	10– 80 lb	Hand ram Jolt squeeze Blowing	60–100	3.0–4.5	60– 90	8.0–10.0	80–150	16–24	130–160
Medium to large	80– 400 lb	Hand ram Jolt squeeze	50– 80	3.0–4.5	70–100	6.0– 8.0	100–150	18–22	130–160
Large	200– 400 lb	Hand ram Slinger	30– 60	3.0–4.5	80–110	5.0– 6.0	90–120	18–22	100–120
Facing Sand									
Small to medium	1 oz– 30 lb	Hand ram Jolt squeezer	80–130 130–200	3.5–4.5 4.0–5.5	40– 70 20– 50	6.0– 8.0 6.0– 8.0	100–150 100–150	20–26 20–26	130–160 130–160
Medium and medium to large	10– 400 lb	Hand ram Jolt squeeze	50 –80	4.0–5.0	60– 90	6.0– 8.0	100–150	20–26	130–160
Large	200–4000 lb	Hand ram Slinger (Skin dry or completely dry)	50– 80	4.5–6.0	70–110	5.0– 6.0	200–250	35–45	200–240

* Equals Green Compression Strength × Deformation

Table VI—Effect of Increased Bond Content on Permeability and other Properties

Western Bentonite %	Moisture %	Permeability	Green Compression Strength	Deformation	Sand Toughness Number*	Flowability	Specimen (2 x 2 in.) Wt. in Grams
Sand A							
4	2.0	150	4.6	13½	62	81	148
5	2.2	145	7.4	14	104	79	147½
6	2.4	140	9.3	15	140	77	148
7	2.8	134	10.8	16¾	181	75	148
Sand B							
3	1.9	63	7.5	13	98	79½	153
4	2.1	60	9.2	14½	134	75¼	154½
5	2.4	54	10.5	16	168	74	153
6	2.9	52	12.1	18½	224	72	153

Sand A—Average AFS Fineness No. 60—Rounded Grains
Sand B—Average AFS Fineness No. 100—Subangular Grains
*Equals Green Compression Strength × Deformation

gray iron molding sand applications, are suggested as a starting point for the selection of the base sand.

The finer sands increase the total surface area and require increased amounts of bond, water and buffer material, which mean increased cost.[1] For example, the sand indicated for medium castings is listed as having AFS fineness numbers 50 to 100. If the base sand used has an average AFS fineness number of 75 with 4 per cent western bentonite and is mulled at optimum moisture, it will test at figures close to the *average* of the physical properties listed for medium castings. Increasing or decreasing the fineness number of the base sand will require adjustments of the quantities of both the bond and water additions in order to maintain the same average test figures.[12] The spread indicated in the data on fineness numbers and the physical properties is not meant to indicate wide latitudes for the *same* sand mixture. Its purpose is to show the working ranges of sands desirable for the castings in the various size brackets as indicated.

Permeability—Permeability, the property which permits passage of gases in sand, is important in the selection of a base sand. With but few exceptions, the amount of permeability is in close relationship to the fineness number of the sand. Moisture, bond, and the buffer materials all lower permeability. The use of these additives should be held to close tolerances because of both their cost and potential scrap losses from lowered permeability.

The effect on permeability and other physical properties of an increase in bond content is shown in Table VI. Each sand mixture had optimum moisture content. Note the bulk density gradient through the weight of the 2 x 2-in. specimen. Many times the difference between a sand that does or does not cause scrap defects because of excessive gas may be only 10 to 20 points *less* of average grain fineness in the base sand, with resultant poor permeability.

Seacoal—Seacoal, the ingredient most commonly used in synthetic sand mixtures for producing a reducing atmosphere and aiding in the control of expansion and contraction, often is used in combination with other combustible materials. Combustible materials may be of a cellulose base, or they may be pitch or any of the processed minerals now used in molding sand.

To best prescribe the amounts of combustible material necessary for any given sand mixture, it is necessary to know the following: 1. Type of combustible material to be used; 2. Grain fineness of the sand; 3. Size (surface area) and weight of the casting; 4. Degree of mold hardness to which the sand will be rammed.

The percentage of seacoal for the sands listed in Table V if no other combustible additive were used would be 6 to 8.5 per cent. It relates to items 2, 3 and 4 above. Percentage of seacoal or any other additives should be controlled.

Moisture—Moisture, in the amount necessary to develop maximum strength of binder additives, is perhaps the most important addition to the sand mixture.[13] In addition, moisture forms a clay-water envelope which acts as a lubricant to permit the grains of sand to pack during the molding processes.

The optimum moisture content of a mulled sand mix is reached when the sand mix is at its minimum bulk density, rather than at the point of maximum green compression.[14]

A prepared sand mixture is said to be *tempered* for the best working conditions when it has a higher percentage of water than at optimum moisture. As moisture increases, the dry compression strength values increase. When this quality is desired, the sand mix can be prepared on the wet side, or the mold or the mold cavities can be sprayed, prior to torch or oven drying.

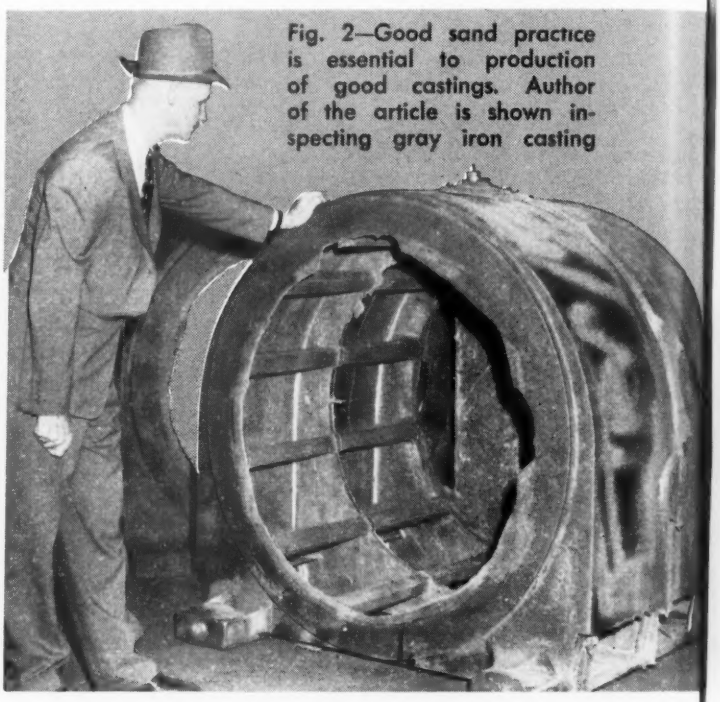


Fig. 2—Good sand practice is essential to production of good castings. Author of the article is shown inspecting gray iron casting

Sands tempered too wet frequently are responsible for as many imperfect castings as the combined scrap from all other causes. The truth of this statement becomes clear when we understand that poorly tempered sands can change all other physical qualities. When moisture at the interface of the mold is excessive, molten metal filling the mold acts with explosive force. Excessive moisture in the mold wall may act to explode a portion of the sand wall, thus causing an erosion scab.[15]

The chief complaint about molding sand on the dry side is lack of moldability. The rammed sand may have high green compression strength, but it will be very brittle. The degree of brittleness is such as can be measured by the deformation test.[16, 17]

Strength of Sands—The strength values of molding sand occur in four different phases: 1. Green strength; 2. Air-set strength; 3. Dry strength; 4. Hot strength.

Green Strength—Green strength in molding sand is measured by compression and tensility. Green compression, perhaps next to moisture in importance of test values, is the strength test most commonly used. The tensile test is important if the sand is subjected to tensile forces.

The function of the clay-water envelope of a compacted sand is best measured by the green compression test. The type and amount of clay are important in that both strength and plasticity must be held to narrow working limits to maintain close consistency of sand mixtures. Insufficient clay or the incorrect type results in a sand with too little green compression strength or too little deformation or both. Such sand is difficult to mold and produces defective castings.

Excessive clay or the incorrect type results in excessive strength values,[18, 19] reduces flowability[20, 21] and increases sand deformation. These effects frequently cause swells, buckles and expansion scabs.

Air-Set Strength—As molds are left open, sand develops an air-set strength on drying. Air-set strength increases as temper water increases. This action has value in jobbing shops where molds can remain open long enough for the air drying to take place. It is of little value in a production foundry.

Dry Strength—Dry strength values are measured by compression and by this medium have proved of real value in the control of sand-wall stability. Dry compression strengths of the original sand mixture are increased by these factors: 1. Increased moisture; 2. Increased fineness of sand; 3. Increased mold hardness; 4. Increased seacoal, pitch, etc.

The dry compression strength test, as part of room temperature sand testing, often is overlooked, but should be performed as a control factor. Once correct dry compression strength in a sand mixture has been established, control is relatively simple.

A major difference in the type of clay used is the amount of resulting dry compression strength one clay may have compared with another, even though adjustments are made to give the same green compression strength. Common practice is to get the desired amount of dry compression in a sand mixture by using proportionate amounts of two clays, one low and one high in dry strength value. The following tabulation illustrates how intermediate dry compression values are obtained with southern and western bentonites.

	100% Western Bentonite	100% Southern Bentonite	50% Western 50% Southern
Dry compression, psi	98	47	80

Dry compression strengths which are too low may promote casting defects through cuts and washes of the mold surfaces. Sand inclusions often indicate too low a dry strength factor. Dry compression strengths which are too high cause a too rigid mold wall and may promote rat-tails, buckles and expansion scabs, or even cracked castings.

Hot Strength—The hot strength test is performed at temperatures approaching the pouring temperature of the metal. It is important in that the sand has properties which are reflected in its hot strength.[22] Since high-temperature sand testing is somewhat more difficult than tests made at room temperature, due to the special high temperature furnaces required, many foundries have hesitated to adopt this phase of sand testing. Hot strength testing at predetermined temperature proved, however, to be an invaluable tool both in development work and in daily control of sand mixtures. Behavior of sand specimens in the hot strength test can be correlated with that of sand in the mold. Thus a sand mixture can, with the aid of this test, be corrected prior to production use. For instance, a low hot strength may cause dirt in castings, whereas hot strengths over the desired limit may cause such defects as rat-tails, buckles, scabs, hot tears, dirt inclusion, fissure, etc. Hot strength testing can assure protection against these defects.

Summary—Naturally bonded and synthetic sand mixtures are intricate in their makeup. The degree of success with which they are used depends on the choice of base materials, the selection of successful properties and their limits and the care and duplication of these properties from batch to batch—in short, application of brains to sand practice.

So, if you would seek a means to reduce costs, raise the quality of castings and get orders to roll in again, look over your sand and review what you know about it. You'll find it really will pay off!

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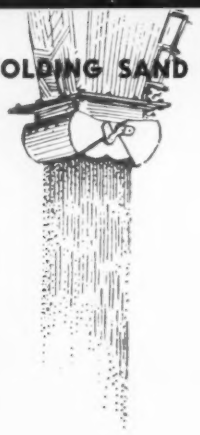

STEEL FOUNDRY MOLDING SAND

The author points out that steel sands have been standardized to a great degree. He lists specifications for molds of various sizes and points out the effects of sand mixture composition on quality of resulting castings

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PROBABLY the least controversial phase of steel foundry operation today is the composition and properties of molding sands. It is almost universal practice to use facing and backing sands. The facing sand in contact with liquid metal is composed either of new or reclaimed sand, or of a blend of about half new sand and used, unreclaimed sand. The backing sand is used sand, retempered, with just enough bond added to maintain sufficient green strength for moldability. Both facing and backing sands are milled, usually in a muller type mixer after each use. The practice of retempering and rebonding backing sand on the molder's floor, so common in foundries casting other metals, has practically disappeared in the steel foundry.

Naturally bonded sands are little used in steel foundry operations. Although there are a number of naturally bonded sands fitted for steel foundry use, their control, especially their retention of high water content as received, has discouraged their use.

The use of an "all purpose" sand, one to act as both facing and backing sand, is restricted to relatively few foundries whose production and especially equipment requirements necessitate it. Even in these foundries the more difficult molds are faced.

Sands Are Standardized—Steel molding sands have been so standardized that it is possible to give a sand mix to within limits of a percent by weight which is being used to mold at least 75 per cent of the steel castings made today:

Silica sand (less than 3 per cent AFS clay) 90 to 92.5 per cent

Western bentonite 4.0 to 5.0 per cent

Partially gelatinized corn flour, or dextrin (usually designated as cereal) 0.5 to 1.0 per cent

Water 3.0 to 4.0 per cent

This sand will show the following room temperature properties:

Green permeability 100-300 (depending on base sand)

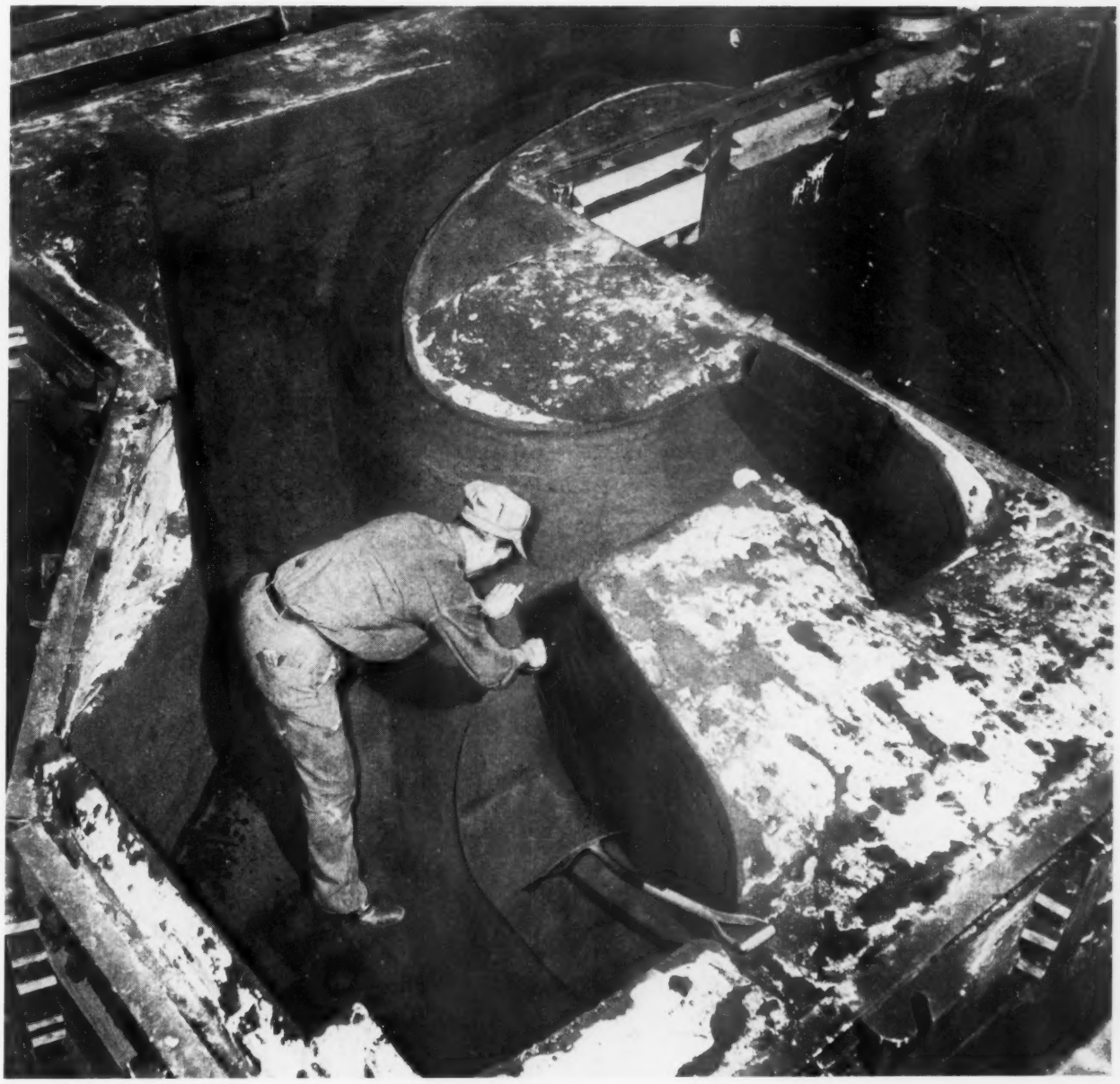
Green compression strength 6.0-9.0 psi

AFS flowability number 6-8

The sand just given can be broken down into a range of sands particularly suited to different casting sizes. It now becomes necessary to quote green properties because the preciseness is such that variations in the base sands limit specification by per cent by weight. The theme now is green strength as a measure of clay content—especially bentonite content—versus flowability. Thermal stability increases as the clay content increases. This thermal stability is obtained at the sacrifice of flowability.

For small castings cast in molds that are filled with liquid steel in a few seconds, the bentonite content is kept as low as possible for maximum flowability. The usual sand is controlled to 5.0-6.0 psi green strength. The exact bentonite addition varies depending on the natural or residual clay content, grain size, grain shape and grain distribution of the base sand. The cereal addition is kept on the low side, 0.5 per cent or lower, for flowability.

For the next class of castings—weighing be-



Pit molding scene shows finishing of drag face of mold for a ship casting

tween, say, 20 and 300 pounds—the bentonite content is increased to give 7.0-9.0 psi green compression strength and the cereal content is kept on the high side, 0.7-1.0 per cent.

For larger castings the bentonite addition is increased further to give green strengths as high as 12 psi, with cereal addition in the order of 1.0 per cent, or slightly higher. This is about the limit of flowability for compaction with present production equipment. As the bentonite and cereal additions are increased the water content is increased to a maximum of 5.0 per cent.

All the preceding sands can be used without oven drying; there is evidence that they perform better as far as scabbing and erosion are concerned without drying, even skin drying. Their limitations are straining and penetration when used for large castings, especially large, high castings that subject the sand to relatively high hydrostatic pressure.

Straining and Penetration—There are three approaches to the problems of straining and penetration. The answer to straining is mold strength. If sufficient strength cannot be obtained by ramming, the next answer is drying, which imparts an increase in compression strength of ten to several hundred fold. As far as sand is concerned, the answers to penetration involve decreasing the void size of the sand by:

The use of a finer grain size base sand, down to an AFS 80 grain size.

The use of a combination of fire clay and ben-

tonite additions to the sand.

The addition of silica flour.

The first approach to penetration—the use of a finer base sand—has been limited due to the lack of such sands in many parts of the country. Another objection is that at least two base sands must be handled, stored and kept separate in the shop. Such sands, green or dry, will resist penetration but must be dried to withstand high hydrostatic pressure without mold wall movement.

The second approach introduces dry sand practice. The use of fireclay-cereal and fireclay-pitch bonded sands has practically disappeared. Bentonite-fireclay-cereal bonded sands have taken their place. The fireclay in these sands has two purposes: As a filler to decrease void size, in the same sense that silica flour is used; the additional clay substance possibly also promotes greater thermal stability, although this point has not been proved formally. Due to the lower green strength of fireclay a sand containing both western bentonite and fireclay is moldable with higher total clay contents than when just bentonite is used.

These bentonite-fireclay-cereal bonded sands generally perform well when much metal must flow over the sand. They have two drawbacks. The sands are "stiff," have low flowability and therefore must be rammed carefully. The more serious drawback is that they should be oven dried. An important change in steel foundry operations during the past ten years has been the elimination in many foundries of mold drying and the ovens and extra handling. The high total clay contents of these fireclay-bentonite sands necessitates water contents between 5 and 10 per cent, and oven drying seems necessary to eliminate or reduce this water. At least the writer knows of no steel foundry using this type of sand that does not oven dry the molds.

The third approach to minimize penetration and straining of large molds—the addition of silica flour to bentonite-cereal bonded sands—is the most popular. This approach has the advantage of flexibility when compared with the use of a fine-grained sand. Practically any void size and permeability can be obtained by increasing the silica flour content. The use of silica flour, instead of fireclay, to fill the voids in the sand seems to have the advantage that sands with silica flour contents to 50 per cent can be and are being skin dried, thus eliminating oven drying. Skin drying of high-silica-flour sands must be performed more accurately than is practical with a gas or oil torch, especially when the silica flour exceeds 20 per cent. Hot air and infrared driers will do the job.

Although molding sands with all silica flour as the base sand are used in extreme cases, a foundry with no experience should approach the use of sands with more than 50 per cent silica flour with caution. These very dense sands are difficult to ram, they must be dried thoroughly, and be properly vented. In most cases these dense sands can be used only as a thin facing and must be backed up with a more open sand. The control of the thickness of this facing is quite difficult.

How Many Ingredients?—Many steel foundries are operating with sands made up of combinations of not more than five ingredients—sand, western bentonite, cereal, silica flour and water. There are as many foundries using one or more additional ingredients, and there are at least several dozen of these "pet" additives. It is significant that the average quality of castings is nearly uniform throughout the country regardless of what additional ingredient or ingredients are used. Perhaps some of these additional ingredients are beneficial in special cases, but the pros and cons lead into almost endless argument. Certainly such argument is impossible in a short, general discussion such as this.

The opposite to complex, six to ten component molding sands must be mentioned. They are sands containing bentonite, water and only a trace or no cereal. These sands have one provable advantage

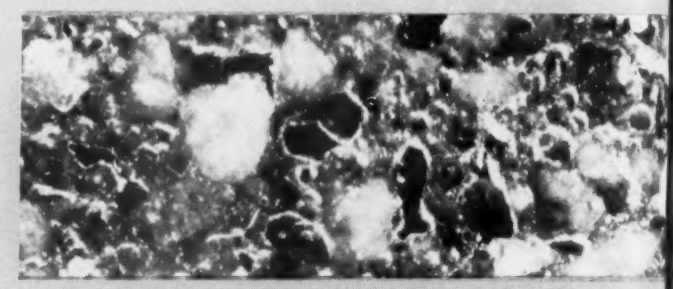


Fig. 1—Surface of sand with 3% western bentonite after a 5-second contact with liquid steel

—low cost. They also have one provable drawback—mold surfaces of such sands dry out quickly, are quite friable and difficult to finish. There is the possibility that such friable mold surfaces will erode when molten metal flows over them, but this point has not been proved. Neither of these drawbacks is significant in high-speed production where the mold is closed up in seconds, poured within minutes. Straight bentonite-bonded sands are quite suitable under these conditions. The bentonite content is usually high—10 per cent or more—giving green strengths as high as 15 psi. The water content is kept on the low side, as low as 2.5 per cent for maximum flowability.

Base Sand—As contrasted with the relative uniformity of additions (except the "pet" ones), the base sands used vary widely. The AFS average grain size varies from 40 to 80. There is a surprisingly small difference in surface finish and surface roughness of the castings made in sands differing so greatly in average grain size. True, the finer sands produce smoother castings, but the difference is not as great as one would expect. The writer is convinced that flowability is such a more potent variable than grain size as to almost completely overshadow it.

The grain shape of the sands used varies from

the rounded Ottawa sands, through the subangular Ohio, Pennsylvania and New Jersey sands to the very angular Gulf coast sands. Again, the surface finish of the castings and the amount of sand displaced by erosion or spalling is remarkably uniform. The same is true of grain distribution. Sands retained on three, four or five screens are used with little difference in casting quality. The preceding remarks do not mean that grain size, grain shape and distribution of the base sand do not have an effect on the sand's performance. There seem to be other variables, particularly metal flow and gating, that overshadow them. The steel foundry industry is just awakening to the importance of metal flow and is just at the threshold to the proper understanding of this important variable.

Another variable of the base sand—amount of natural clay—also differs widely. Natural clay contents up to about 3.0 per cent are present in enough sands performing satisfactorily in production to say that these natural clays are not detrimental.

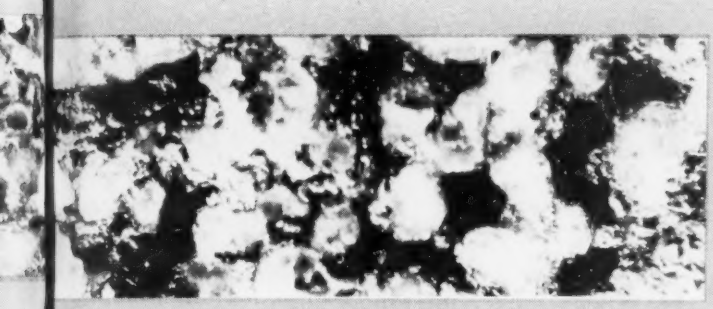


Fig. 2—Surface of a sand containing 8% kaolin clay after 20-second contact with liquid steel

Many foundries claim that these clays are advantageous, and crude sands do have the advantage of low cost. One provable disadvantage to crude sand is its retention of water as received, up to almost 10 per cent in some instances. The problem of drying these sands and the control of a varying water content in the base sand is the chief reason that many steel foundries prefer washed and dried sand. Traces of impurities other than feldspar have never caused trouble.

The latest development in steel foundry sands has been the acceptance and spreading use of reclaimed sands. These reclaimed sands behave the same as new sand; their advantage is one of reduced cost. Either water or air scrubbing is satisfactory, and the method used depends primarily on local conditions and preference.

Western Bentonite — Western bentonite is so widely accepted in the steel foundry that little thought is given as to why it is used. The usual answer is that a smaller amount of clay is needed to make the sand moldable, and the refractoriness of the sand is therefore higher. This answer is true in regards to water, for the whole American green sand practice for steel castings is based on low clay contents and the low water contents that are possible because of the low clay content. However, the high green strength of western bentonite is actually a disadvantage, in that it decreases flowability.

If it were not for the water problem, a lower strength clay would be beneficial, in that more clay could be used to promote thermal stability. This line of thought seems to indicate that the judicious use of low green strength fireclay with bentonite would be advantageous in green sand practice. Experiments along this line (admittedly poorly planned and not carried to completion) have been discouraging. Perhaps the reason for this lack of success in mixing bentonite and fireclay is due to just the opposite of general thought in the steel foundry. Western bentonite is a flux, and a sand with 3 per cent bentonite will have a lower sintering point than one with 8 per cent kaolin clay. This sintering relation is carried over to the mold surface. A sand containing bentonite will glaze when in contact with molten steel in less than 5 seconds, as shown by Fig. 1. A sand containing fireclay does not glaze, even in 20 seconds, as shown by Fig. 2.

Cereal—The writer has always been puzzled regarding the role of the partially gelatinized corn flours and dextrin in steel molding sand. Their use is almost universal, but just what they do when the sand is in contact with liquid metal has never been established. They definitely make the sand surface easier to finish and are necessary for large molds for this reason. They also make the mold surface harder and less friable, but if this carries over to the casting itself it has never been proved. Their almost universal use is pretty good proof that they are needed, even though it does not tell why.

Molds for small castings made from the sands discussed are poured as rammed. Molds for medium size castings are poured as rammed, or washed with a silica flour base wash almost at the whim of the foundry. Molds for large castings, say over 500 pounds, are almost always washed or sprayed with a silica flour base wash. A properly applied wash will give a smoother cast surface and cover up some soft ramming, but it is certain that a wash cannot be expected to prevent penetration, or sand displaced by erosion or spalling. Thermal stability and resistance to penetration must be built into the sand itself.

The sands described can be expected not to scab, buckle or spall, unless grossly abused by improper gating and metal flow. Undried sands containing less than 10 per cent silica flour have sufficient collapsibility to keep hot tearing at a minimum. Dried sands are, in reality, core sands and outside the scope of this article. These sands have one serious defect. They erode when in contact with flowing steel for the first few seconds, until a glaze forms. This erosion is not great (over 95 per cent of many castings can be made free from sand after machining) but in this day and age this is not good enough. Our customers want no sand—period.

Acknowledgment—The writer must acknowledge the help of E. C. Troy in reading and correcting the manuscript.

Molding Sand Practice in the

MALLEABLE FOUNDRY

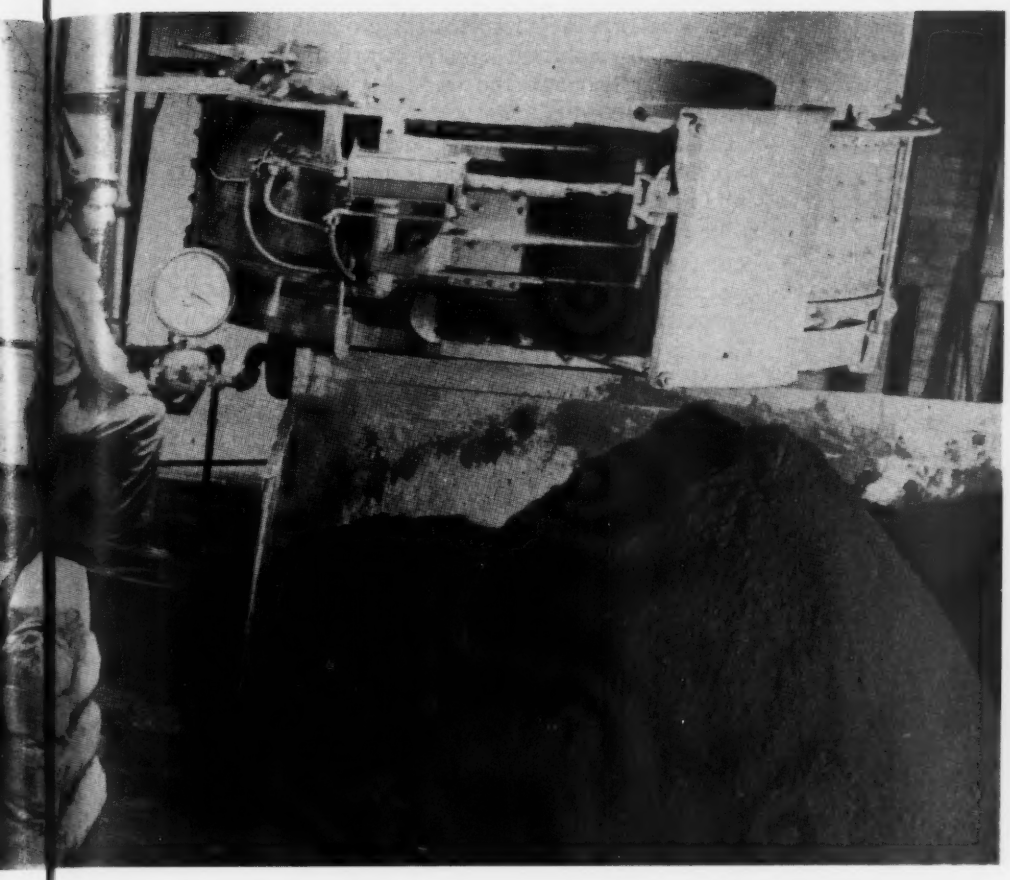
Good malleable sand practice must be built around the proper base sand. In the choice of that sand, it is important to consider the physical and mechanical requirements of the system sand required to make the castings

FOUNDRY mechanization and modern sand handling equipment have emphasized the importance of sand control in the production of malleable castings. Prior to the introduction of sand testing equipment and modern sand preparation methods, a molder usually was responsible for the sand from which his molds were made. He squeezed a handful of sand to determine whether the moisture was correct for the job at hand. A little further squeezing, and the sand took the shape of a shoestring potato. By pulling from both ends until the sand broke in the middle, he satisfied himself that the strength was sufficient.

Occasionally the molder rubbed a handful of sand against a shovel and then carefully examined the surface of the sand. The skill and know-how of these molders made it possible for them to make good castings despite the fact that they often were handicapped by materials, patterns and accessories of inferior quality.

Methods developed over the last 25 years are an outgrowth of the work of the old-time molder and his improved methods. With the gradual improvement in sand preparation equipment, pattern equipment and better molding technique, casting finish has improved constantly. Today, many malleable castings are purchased strictly on appearance, and the demand for castings with sales appeal is a reality. The trend in malleable shops is to improve both molding technique and sand practice.

Various types of sand preparation equipment are being used. During selection of equipment, these



By L. E. EMERY
Chief Metallurgist
Marion Malleable Iron Works
Marion, Ind.

Truck with scoop delivers shakeout sand to receiving hopper of a screening and magnetic separator unit. The clean sand moves on a belt to the bucket loader and is raised to the muller

factors should be considered: 1. Initial cost of sand handling equipment; 2. Cost of preparation of sand to make a finished mold; 3. Cost of control equipment; 4. *Tolerances required for castings to be produced;* 5. Flexiblity of equipment; 6. Class of work to be made; 7. Capacity of sand unit required and type of system to be used (natural, synthetic or a combination of both).

Selection of equipment is of great importance today, particularly since the introduction of the shell molding process. To produce castings with very close tolerances in a green sand system, we must consider cooling the sand, installing moisture control equipment and having the proper preparation equipment to do the job.

Base Sand Is Foundation—Good malleable sand practice must be built around the proper base sand. In determining the most suitable base sand, it is important to consider physical and mechanical requirements of the system sand required to make the castings. Also not to be overlooked are uniformity, impurities and availability of a constant, uniform supply. Any number of combinations is being used, ranging from a combination of lake and bank sand to a combination of washed and dried silica sand and naturally bonded sand. Some malleable shops are using a straight washed and dried silica sand throughout the plant.

Six types commonly are used: Washed and dried silica, crude silica, lake sand, bank sand, naturally bonded sand and washed and air-dried silica. Regardless of which sand or combination is used, it is good practice to keep the molding sand fine and as dry as possible and to operate with a minimum of green compression.

Synthetic sand systems are becoming more popular in malleable foundries because of the demand for better finish and lower operating costs. Ideal practice is to select a base sand that will give the desired results in both the coreroom and the foundry. If such a sand is not available, two sands can be blended to obtain the ideal fineness. Unless excellent weighing equipment is available and a well controlled sand control program is in effect, blending may not be satisfactory, but this practice will give very good results if controlled properly. Various combinations of lake and bank sand ranging from a 50-50 ratio to a 25 per cent bank sand and 75 per cent lake sand mixture have been used.

In the author's plant a core sand was selected which would give the desired results for both core making and molding. Grain size and distribution of the core sand are identical to those of the molding sand. The core sand finds its way into the foundry molding sand via the shakeout and does not upset the properties of the molding sand. The objective in using one type of sand was to enable better control of sand preparation, reduce costs and eliminate variables that arise from the use of several sands in a synthetic system.

Use Wide Distribution—A system of this type requires a base sand with a wide distribution pattern. A washed and dried silica sand with a dis-

tribution over 4½ screens was selected. This sand contains less than ½ per cent clay, has excellent flowability, is bonded easily and has good workability in the coreroom and foundry. Careful control of incoming shipments is important to the success of this type of system. Listed in the accompanying table are typical screen analysis and green properties.

Base Sand As Received	
Mesh	Per Cent Retained
30	0.40
40	4.98
50	10.48
70	26.82
100	35.32
140	19.64
200	2.44
270	0.20
Pan	0.08
AFS grain fineness 65.2	

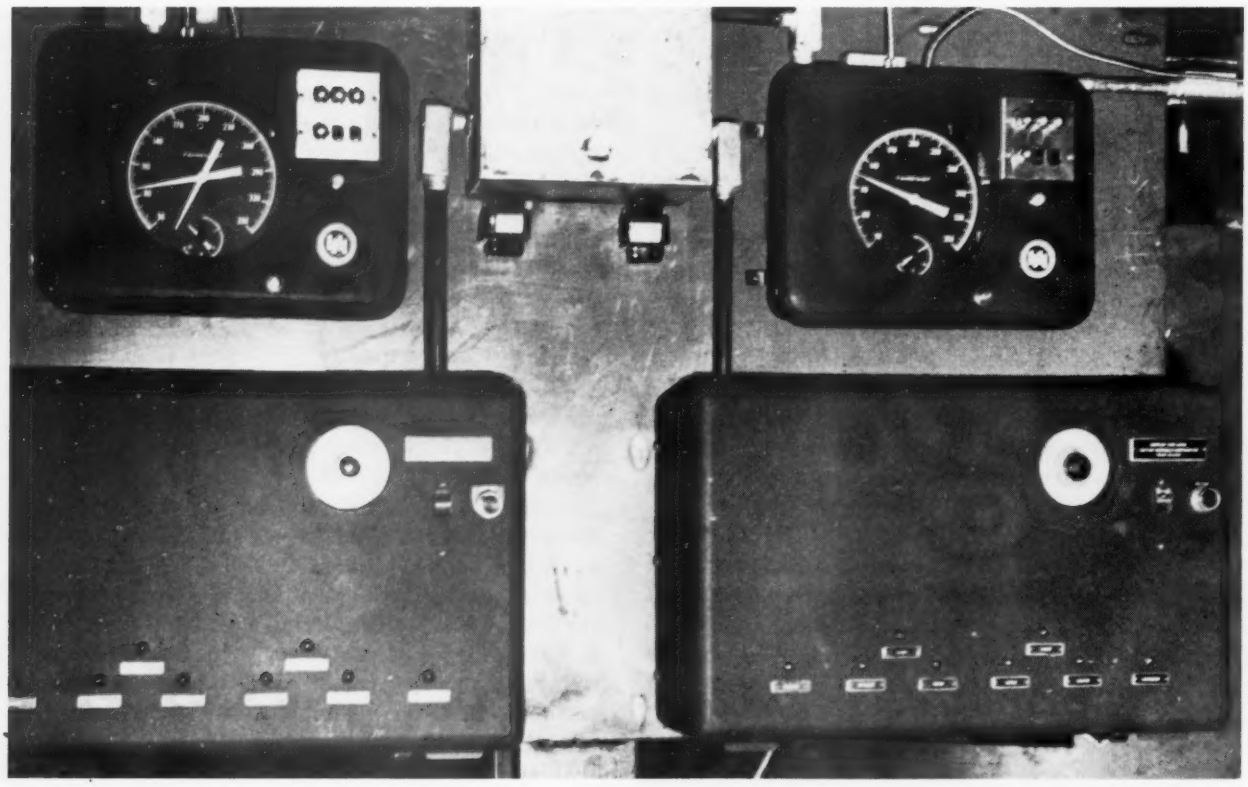
System Molding Sand	
Mesh	Per Cent Retained
30	0.24
40	3.53
50	10.06
70	27.42
100	31.90
140	16.26
200	3.00
270	0.24
Pan	0.14
AFS grain fineness 66.52	
Permeability 80-100	
Moisture 3.3-3.7%	
Green Comp. 9-11 psi	
Deformation 0.015-0.020	
Combustible 5.00-6.50%	

Screen analysis on the molding sand is made after clay and combustibles have been removed. As the typical screen analysis shows, the screen tests are very comparable. Two screen analyses are made daily on the molding sand. Clay and combustibles are checked on the same sample that is used for the screen analysis. The samples used for the screen analysis are taken from the molding stations and represent 3 hours of sand. From the results of the distribution tests it is very simple to determine whether new sand additions are necessary to hold the pattern within tolerance. Occasionally it becomes necessary to make raw sand additions to maintain a good distribution pattern. This is particularly true when not many cores are being used in the foundry.

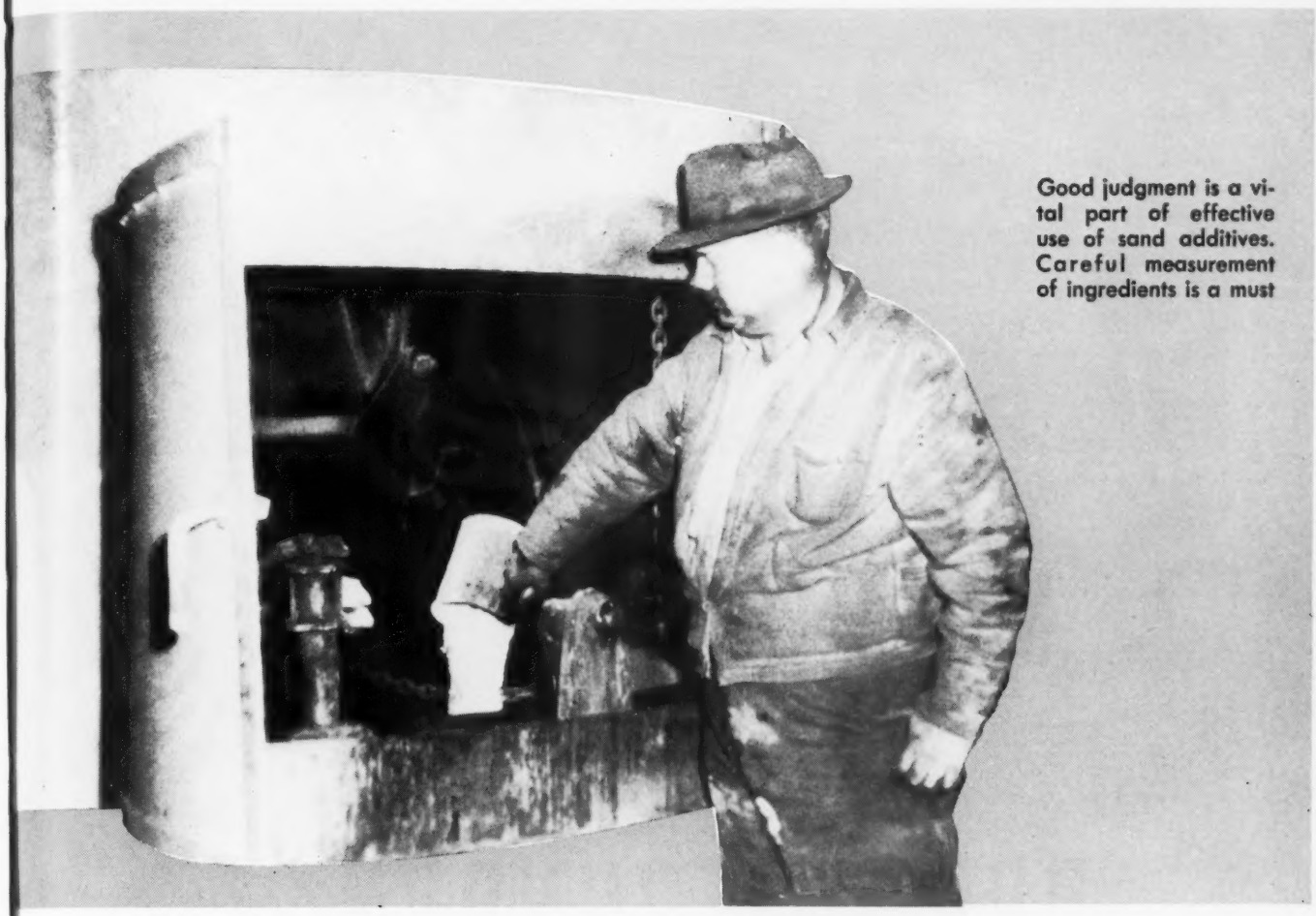
Close control over binder additions, mulling procedure and water additions is necessary for good molding sand practice. Automatic moisture controllers which compensate for fluctuations of temperature and moisture content of return sand from the shakeout make it possible to hold the moisture content of the molding sand within 0.40 per cent. The sand is measured in batch hoppers, and because of the manner in which the water is introduced into the mill, sand temperature decreases. Good aeration equipment improves the feel of the sand and increases flowability. Old-time malleable foundrymen used a riddle, which provided a form of aeration. Good preventive maintenance and cleanliness of equipment also are not to be overlooked. Proper adjustment of plows, replacement of worn parts and elimination of tramp material from the system are vital to an uninterrupted supply of sand.

The economy, simplicity of control and elimination of facing sands have attracted malleable foundries to synthetic systems. However, in some shops without adequate mulling equipment natural sands still are being used.

Sand Additives — Aside from the binders and water used in malleable molding sand, carbonaceous materials play a vital role in the casting process. Seacoal, the most common of them, offers much to the peeling characteristics of synthetic systems.



Automatic moisture controllers compensate for fluctuations of temperature and moisture content of sand which is returned from the shakeout



Good judgment is a vital part of effective use of sand additives. Careful measurement of ingredients is a must

but additions of seacoal must be controlled since they affect many of the properties of molding sands. When selecting a seacoal for malleable work, one should consider: Fineness of base sand, grain distribution, base permeability of molding sand, pouring temperatures, type of binders to be used, analysis of seacoal and size of castings to be produced. A check of the combustible content of the sand and observations of the peeling characteristics are the two most common means of control of seacoal additions.

Excessive additions of seacoal result in brittle sand and necessitate higher clay and moisture additions, which may lead to blows and porosity. Although six grades of seacoal are available, the grades most commonly used in malleable work are C, D, and E. Other carbonaceous materials, including liquid carbon, are being used in place of and in combination with seacoal. Liquid carbon reduces dust and dirt in the foundry and increases flowability, with a marked reduction in brittleness.

Most common binders used in synthetic practice are the bentonites. Southern bentonite imparts good green physical properties, and western bentonites are used for hot and baked properties. Since malleable iron before annealing is very susceptible to cracking, the excellent shakeout properties that result from the lower hot and dry strength of southern bentonite tend to alleviate that problem. In the author's plant, southern bentonite is used almost exclusively. Castings with sections of 1 in. and over and in excess of 25 lb require a blend of southern and western bentonite. Various combinations can be used successfully, depending upon the class of work produced. Ratios vary from a 10 per cent western and 90 per cent southern to a 50-50 ratio. As western is increased, moisture is more critical and flowability is reduced.

Fireclay sometimes is used with bentonite, but moisture requirements then are greater, and permeability is reduced because of the increased amount of fines. Approximately three times as much fireclay as southern bentonite is required to develop a given amount of strength.

Numerous additives are available to promote specific properties and overcome casting defects. The practice of using such additives in sand mixes tends to make sand control much more complicated and usually more expensive. The use of these "aspirin tablets" is not conducive to good sound practice. Certainly there already are many variables over which we have no control, and any additional variables which we create by use of additives or fillers create new problems. If enough emphasis is placed upon pattern equipment, molding procedure and sand preparation and control, a malleable foundry employing green sand practice can market a casting with sales appeal and close tolerances.

MOLDING SAND in the BRASS FOUNDRY

NATURAL molding sands have developed through the ages from the powdering of granite ledges. Mother nature disintegrated this material, and the velocity of ancient glacial streams was responsible for different deposits found in the northern part of the country.

In the southern part of the country there was no glacial action; thus many molding sands are taken from beds of natural decomposed rock. Sands of the northern zone are weathered and washed and have rounded grains. Sands from the southern zone have subangular grains. However, both are good sands.

When water is added to dry molding sand, it sets a colloidal movement into play. This movement carries the finely divided clay from one grain to another until it has become equally distributed throughout the entire mass of the sand pile. This movement at work under a cover glass, magnified 500 times, is very clear. While the speed seems very rapid under the microscope, it is only ¼-in. in 24 hours in the sand pile itself, depending, of course, on the per cent of moisture in the sand.

It was customary in the early days of foundry practice to use the sand only once a day, then add enough water to bring back into temper overnight. In this way it was possible to distribute fresh clay from the unburned grains over the baked grains, bringing them back into temper.

Today, time is essential, and foundrymen have learned that if sand containing the proper amount of moisture is passed through a No. 10 riddle, it will come back into temper in one hour. If sand is put through a muller, the time can be decreased to 1½ minutes. This is due to the fact that fresh clays are forced over the baked grains by mechanical pressure, aiding colloidal action within the moist sand itself.

Reaction Under Heat—Consider four grains of sand next to the surface of the casting and study their reaction under the heat of molten metal as it forms into a casting. The first grain next to the casting becomes heated and explodes, fracturing into dust-like particles which become silt and therefore unfit for further use as a molding material. However, the silt is now in the sand pile.

By WILLIAM B. GEORGE
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Chicago

Sand should be regarded as something which is alive and changes from day to day. If it is given attention on this basis, it will yield good castings. If it is considered to be only dead material, it will cause trouble

Sand grain No. 2, which lies behind No. 1, did not have as much heat as No. 1 and did not explode, but the temperature was high enough to bake the clay surrounding it. This grain must be recoated with fresh clay before it is fit for reuse in molding sand. Next, examine No. 3 grain. It has become encased with a coating of hard clay. This clay must be softened before it can be brought back into further use. No. 4 and all the following grains to the rear are natural as they were first introduced into the mold. No. 2 grain has no bonding power and must be recoated with unused clay from No. 4 and the following grains. No. 3 grain must have moisture to resoften its clay coating.

When there are too many No. 2 grains in the sand pile there is insufficient clay on the following grains to coat them properly and obtain the necessary strength for a good, workable sand. At this point new sand must be added bringing in fresh clay or additional bonding material such as bentonite, fire clay, dextrine or the like must be worked into the sand.

As the sand becomes contaminated with dust from No. 1 grains these things happen: First, permeability of the sand is lowered. Second, the sand requires increased moisture content to keep it in suitable working condition. Third, lead in leaded brass and bronze alloys fuses with the silica silt on the face of the casting. Phosphorus fuses the sintered alumina, forming little hard spots that show up on the surfaces of polished and plated goods.

Desirable Properties—To be worked properly, sand must have the following suitable characteristics: Good green compression strength, suitable permeability and deformation qualities. These will vary in different sands and the foundryman must check his sand piles daily if he expects to keep losses down. Good green compression strength is necessary to get good lifts and to avoid drop-outs. Enough permeability is necessary to avoid boiling of metal within the mold. Deformation qualities are essential to avoid crushes within the mold.

It has been found that a good rule to follow is to add 1 lb of new sand to the heap for every 5 lb of metal cast. This will keep the sand pile in balance and keep the silt content low enough to prevent undue damage to the heap. This ratio also replaces the sand that adheres to the gates and is unfit for further use.

In good foundry practice the foundryman esti-

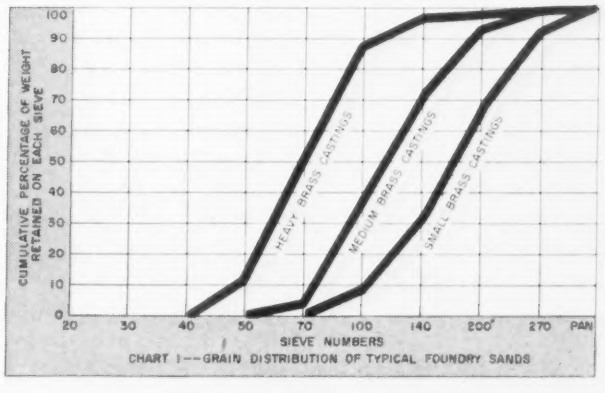

Fig. 1—Typical sand grain distribution on the screen—light, medium and heavy brass castings

SCRAP REPORT

Weight of Castings Made—10,000 lb. Weight Lost—500 lb. % Lost—5

PATTERN NUMBER	CASTINGS MADE	SAND HOLES	DROPS	CRUSHES	RUN OUTS	CORE BLOWS	SHIFTS	MISRUNS	EQUIP-MENT	LEAKERS	MISC.	LOST	REMARKS
123	100	0	0	0	0	0	10	10	0	0	0	20	Check Pattern
456	105	5	5	0	0	0	0	0	0	0	0	10	" Sand
789	208	0	0	0	0	0	16	0	0	0	0	16	" Pattern
101	101	0	0	0	0	0	0	0	7	0	0	7	" Flasks
112	102	0	8	8	0	0	0	0	0	0	0	16	" Sand
131	103	0	7	0	8	0	0	0	0	0	0	15	" "
132	402	10	2	0	0	12	0	0	0	0	0	24	" "
133	505	15	0	0	0	0	0	0	0	0	10	15	" "
134	78	0	0	0	0	0	4	0	0	0	0	4	" Pattern
135	104	0	0	0	0	0	0	0	0	8	0	8	" Gate
136	307	6	1	3	2	0	0	6	0	0	0	18	" Molder

Fig. 2—Scrap report chart illustrates one way to keep track of casting losses as they occur in the foundry

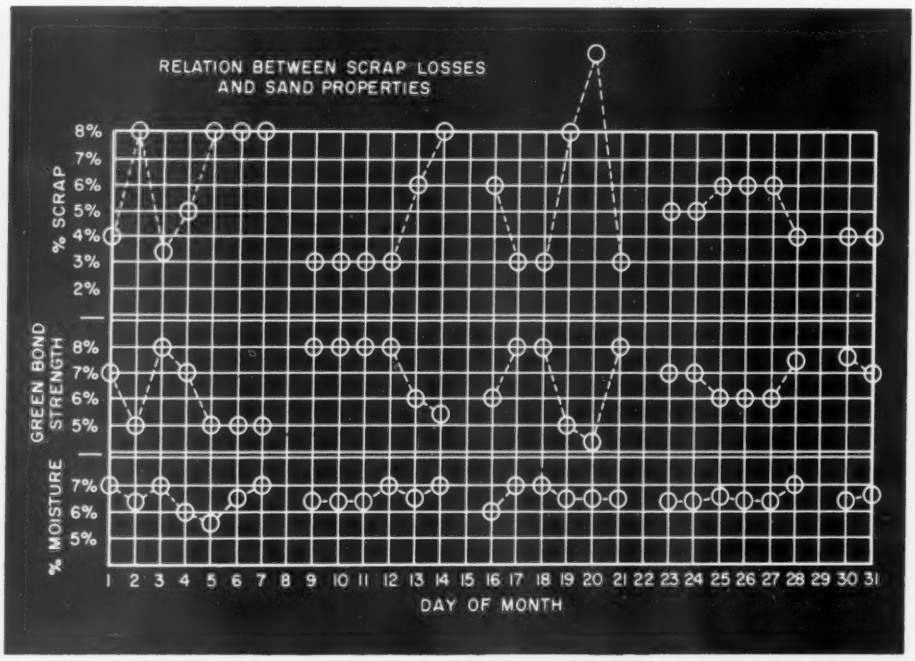

Fig. 3—With charts of this type, green bond strength can be plotted against the daily scrap percentage

mates the amount of metal to be poured each day and divides this figure by five for new sand. He then adds an equal amount of old sand, mixes it, and uses this for facing throughout the day. This will produce clean castings with a minimum of "burn on."

A good method for checking sands visually is to use the vibrator test developed by the late Eugene Smith. Place about 2 oz of sand in a bottle, fill it with water, then set the bottle on a pattern plate that has a vibrator attached. The clay, silt and sand will separate out in bands for visual inspection.

Things To Watch—There are a few conditions in the foundry that do not register on present equipment for testing sand:

1. A good foundry sand, in its proper working condition, should feel to the hand like a piece of velvet. This happens only when all the grains are coated and the sand is free of silt and dirt.

2. Should the sand feel mealy, it is too high in clay content and the individual grains are sticking to each other, making small clusters that produce rough castings. On the testing equipment this sand appears to be of fine grain, but results are often discouraging.

At times there is an excessive amount of lime in the sand pile. This lime may be present in the original shipment, or may be due to an excessive amount of lime added in the water used for tempering. When molten metal comes in contact with lime these particles calcine and the metal enters between the grain boundaries, producing rough castings. To test for lime, take about 2 oz of sand and add a tablespoonful of nitric acid to it. If it boils, the sand has too much lime.

Controlling the Finish—Casting finish is governed by grain size of the molding sand. When the desired finish is not obtained from a proper grain size material there is either excessive build-up of foreign material in the sand or the sand pile is mealy. Fig. 1 shows the typical distribution of sand grains as they normally would appear on the screen test for different kinds of brass and bronze castings.

Table I shows AFS test results of three natural sands suitable for use in casting light, medium and heavy brass castings. Some of the larger brass foundries now are using synthetic sands; sand compositions for producing small and large castings, and a cement bonded sand are given in Table II.

A method for keeping track of casting losses as they occur in the foundry is given in Fig. 2. Fig. 3 is an example of how green bond strength and moisture content of the sand can be plotted against the percentage of scrap each day. Only through charts of this type can the foundryman pin his troubles to the exact cause and make the necessary corrections. Such charts are essential to good foundry operation.

If sand is considered as being "alive" and changing from day to day, and if it is given the same attention extended an animal pet, it will produce good castings. If it is considered as inert, dead material, deserving little attention, it will give trouble.

TABLE I—Test Results for Three Natural Sands

	Light Brass Casting	Medium Brass Casting	Heavy Brass Casting
Moisture	7.0%	6.2%	6.8%
Permeability	17.6	30	140
Green Comp.	9.0	14	14.0
Dry Comp.	30.0	37	50.0
AFS Screen			
No. 6 Mesh	...	...	...
No. 12 Mesh	...	...	...
No. 20 Mesh	0.1%	0.2%	0.2%
No. 30 Mesh	0.2%	0.4%	2.0%
No. 40 Mesh	0.4%	1.0%	12.0%
No. 50 Mesh	0.6%	1.2%	20.0%
No. 70 Mesh	0.8%	3.0%	24.0%
No. 100 Mesh	1.2%	15.0%	13.0%
No. 140 Mesh	21.0%	44.2%	3.0%
No. 200 Mesh	45.0%	12.0%	0.6%
No. 270 Mesh	7.0%	1.0%	0.4%
PAN	4.0%	1.6%	1.0%
Total Screen	80.3%	79.6%	76.2%
Clay	19.3%	20.0%	22.0%
Total	99.6%	99.6%	98.2%
AFS Average Fineness	139	101	53

TABLE II—Synthetic and Cement-Bonded Sands

	Valve and Other Small Castings	Large Castings Up to 500 lb	Large Castings 1000 lb to 65 tons
180 mesh silica or clean bank sand	100 parts	...	...
100 mesh silica or clean bank sand	...	100 parts	...
50-70 mesh silica sand	...	...	90 parts
Southern bentonite	7-8 parts	5-6 parts	...
Wood flour	2-2½ parts	1½-2 parts	...
Portland cement	...	...	10 parts
Water	5-6%	4-5%	6-8 parts
Air drying time	...	...	72 hr

*All parts are by weight

Fig. 4—Sand is not dead, inert material. It changes from day to day and must be treated accordingly before it will produce good castings

ALUMINUM FOUNDRY

Molding Sand Use

Satisfactory aluminum alloy castings can be made without special laboratory control of heap sand, but for best results and high yield of quality heat treated specification castings, controlled sand is necessary

Fig. 1—Chart can be used to plot sand property data, as shown here to determine any casting defects which are caused by sand conditions

By WALTER J. KLAYER
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Aluminum Industries Inc.
Cincinnati

PERHAPS as many different types of sand are used for the production of aluminum alloy castings as there are foundries. The reason for this condition may be that almost any locality has a sand bank nearby from which a foundry can get sand that will produce satisfactory castings. Local sand is relatively cheap, but the use of distant sands can entail freight charges in excess of the sand cost itself. Many types and varieties of sand may be used because common aluminum alloys cast relatively satisfactorily in practically any moldable sand.

The temperature of molten metal for casting aluminum rarely exceeds 1400°F. Weight of metal in the molds usually is light, and density, heat capacity and heat conductivity are low as compared with those of ferrous or copper-base alloys. These factors result in less heating of the sand mold, less deterioration of the bond and less breakdown of the sand grain size.

Many small aluminum foundries are in existence due to the low initial cost of setting up a working unit. Often these foundries are prosperous and produce castings for local use, for private use in finished equipment or for saleable articles without strict quality control requirements. Experienced personnel usually operate these foundries by the rule-of-thumb method. Surprisingly enough, these foundries often are successful and produce good castings.

Such foundry units ordinarily have no laboratory. They usually make castings from a few standard, easy-to-cast alloys such as 95-5 aluminum-silicon, Alcoa 43, nominal 7 per cent copper (known as No. 12), Alcoa 212 or the copper-silicon alloys.

Castings from these alloys usually are satisfactory for the purposes intended, but they rarely are used for engineered parts requiring specialized properties and guaranteed performance. They seldom are subjected to severe service applications with accompanying physical property requirements, such as heat treatment, x-ray and others.

Sand in such foundries usually is chosen because of the reputation of the sand producer or because previous use has shown it to be satisfactory. The sand is excellent material as it arrives in the foundry.

It is tempered until it "feels" right and until trial molds make good castings. The heap adjacent to the molder's bench or molding machine is tempered by the addition of water with a hose or with sprinkling can and is cut and turned with a shovel. It is aerated only when the molder uses a hand riddle during the molding operation.

From this point, the sand heap really takes a beating, and everything wrong with the castings is blamed on the sand—usually rightfully. First the foreman adds more water, but with no results. Then, one at a time, he adds new sand, clay and bank sand, to open it up. When none of them helps, he finally starts all over with new sand. Still the results are questionable; but the boss, who usually is president, too, works all night and all week end and has things fairly well ironed out for Monday morning because of his personal experience with sand preparation.

When these small aluminum alloy foundries try to make quality specification castings they realize that the sand pile is the most important tool in their shop; so they invest a nominal sum of money in a sand laboratory. This need be only a small, clean, well-lighted room about 10 x 12 ft, containing basic sand testing equipment. Such equipment might include a set of screens, a clay tester, good balance, small oven, standard rammer, permeability tester, hardness tester, universal crush test unit, rapid moisture determining device, a desk, wall chart and record file. A laboratory of this size can be set up, with the necessary pedestals, tables etc., for less than $5000. The sand laboratory at Aluminum Industries Inc., Cincinnati, is shown in Fig. 2.

A sand laboratory is indispensable when errors or carelessness occur in the foundry. The laboratory technician can spot the trouble quickly, permitting immediate corrective action.

A typical natural aluminum foundry sand has the following characteristics: AFS grain fineness, 140-270; clay, 10-25 per cent; AFS permeability, 5-30;

green compression, 5-10; and water, 5-7 per cent.

A typical synthetic aluminum foundry sand has these characteristics: AFS grain fineness, 60-100; bentonite, 3-5 per cent; AFS permeability, 50-150; green compression, 5-10 and water, 2-5 per cent.

A natural, fine-grained sand with high clay content commonly is used if a very smooth casting surface is desired or if mechanical reconditioning equipment is not available for handling synthetic mixtures. The moisture of such sands must be controlled closely so that the low permeability does not result in blows and gas porosity.

By preparing and recording all data regarding sand properties on a chart, as shown in Fig. 1, small aluminum foundries can plot sand property data to determine casting defects caused by sand conditions. By use of sand testing equipment, a sand heap can be controlled to meet a standard determined by the type of sand handling equipment and molding used. A sand laboratory is just as important to a small, floor heap shop as it is to larger, automatic sand handling, machine molding foundries.

If no data are available or if tabulation of data from a newly acquired laboratory takes too long, recommended data as furnished in "Recommended Practice for Sand Casting of Light Metal," published by the American Foundrymen's Society, or other sand articles that have appeared in the technical press will be helpful.

When laboratory facilities are being used for close control of heap sand, properties of production sand at the mold must agree with test sample data if laboratory results are to be of any real value.

It is a waste of time and effort to test sand under laboratory conditions without control over the molding floor. If laboratory-determined mold hardness gives desired results, but the molds are not made to that hardness, the whole sand testing system is worthless. All laboratory data must be utilized to the utmost to gain optimum sand properties in the production mold. No matter what sand is used, a tabulation of results as indicated in Fig. 1 will establish the range of each property that gives the best percentage of good castings.

Established limits of naturally bonded molding sand used in Aluminum Industries' main foundry are the following: AFS grain fineness, 100-120; AFS permeability, 25-30; strength, 11-16; clay, 13-16 per cent and water, 5-6 per cent. Castings weighing from a few ounces to 500 lb are produced in this sand. A view at the foundry is shown in Fig. 3.

Even with good laboratory control, some alloys require special sand additives to the standard molding sand to get maximum physical properties and good surface finish. Boric acid is one additive used in the production of aluminum-magnesium alloy castings. The great increase in tensile strength and elongation is well worth the addition, as shown in the table on the following page.

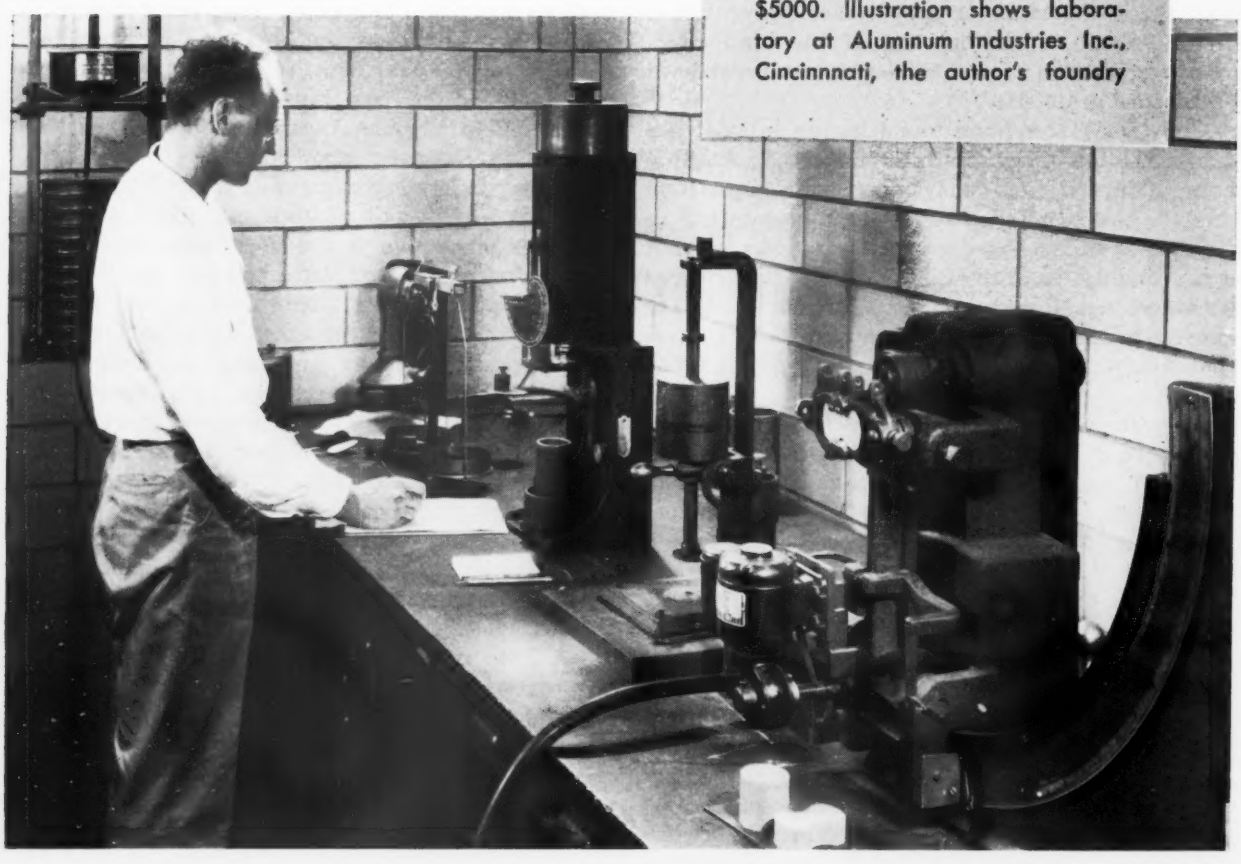

Fig. 2—Satisfactory sand laboratory can be set up for less than $5000. Illustration shows laboratory at Aluminum Industries Inc., Cincinnnati, the author's foundry

Fig. 3—Aluminum Industries' main foundry produces castings in naturally bonded sand which weigh from a few ounces to 500 lb. View shows foundry

Sand	Tensile Strength, psi	Elongation, %
Regular sand	43,000	13.0
2½ % boric acid	51,500	14.0
5% boric acid	55,500	16.5

In 5 per cent boric acid sand, burning-in is eliminated entirely—even on a casting with a gross weight of 2700 lb and sections up to 3 in. thick.

Other sand additives used extensively, especially on the aluminum-silicon alloys containing magnesium, are ammonium fluoborate, potassium fluoborate, sodium fluoborate and ammonium fluoride. The additive either is sprayed on the mold or added to the sand with the water. The required amount is ½ to 1 per cent by weight of sand. These additives eliminate casting surface defects and sand reaction caused by steam and oxygen during solidification of the metal.

Some additives are used to counteract reaction of the alloy with water in the mold. Less moisture or dried molds in some instances would give similiarly good results, but drying molds or working and molding low moisture sand is more costly than adding inhibitors.

Satisfactory aluminum alloy castings can be made without special laboratory control of heap sand, but for best results and high yield in the production of quality heat treated specification castings, controlled sand is a necessity.

Illustration shows molders working on large section of a mold for a magnesium aircraft casting

MAGNESIUM MOLDING SAND

Control of moisture content is an important factor in magnesium molding sand practice. Diethylene glycol aids retention of the small amount of moisture used, and inhibitors can help to protect metal to some degree

By K. J. HOPP
Sand Control, Magnesium Div., Howard Foundry Co.
Chicago

WASHED and dried silica sand is used in Howard Foundry Co.'s magnesium sand foundry division. It contains less than one-quarter of 1 per cent clay. The sand is mulled in high-speed mullers, which are fed by an overhead belt conveyor system. Periodically mulled sand is sampled and a chemical and physical analysis is run. Water, diethylene glycol, inhibitors and bentonite are added during mulling.

Moisture Control Vital — Moisture content of molding sand for magnesium is extremely important. A 2 per cent moisture content generally is maintained in this foundry, although this percentage will vary slightly. One per cent of diethylene glycol is added to retain moisture and counteract excess sand holes caused by sand that is too dry. Too much moisture in the sand results in the formation of chain-like oxides. Sometimes, these oxides penetrate completely through the walls. Also, inhibitors may not protect the metal when moisture is high. Even higher percentages of inhibitors may not help, so it is important to control moisture content first.

Inhibitors are used in the amounts of 2 per cent sulphur and one-quarter of 1 per cent boric acid. Sulphur and boric acid, as a combination, have proved to be the most economical and effective inhibitors. These inhibitors give off gases which form a protective skin or crust on the metal which, in turn, minimizes oxidation. An insufficient

amount of inhibitors also can cause oxidation, which is usually identified by pock-marks on casting surfaces. Oxidation does not always take this form, of course, but it is consistent enough to be generally associated.

Permeability Affects Quality — Permeability of molding sand for magnesium is another critical item. It goes without saying that the finer the grain size of the sand the less permeability there will be.

Low permeability may lead to blows, scabbing and misruns, particularly on thin-wall castings. To eliminate low permeability, coarse sand is added to open up the sand. Too much coarse sand leads to rough castings. Since greater than average quantities of gases are developed in casting magnesium, a high permeability is necessary, yet a fine finish usually is demanded.

Green strength of sand varies with different castings. Sometimes, because of the shape of the casting or the way it is positioned in the mold, arbors, barred flasks and wires are used to increase mold strength.

Theoretically, addition of bentonite, the prime source of green strength, decreases permeability as it increases green strength. This, however, is not 100 per cent the case. The ratio of water to bentonite also will affect permeability.

Green Strength and Flowability — The greater the green strength the less flowability of the sand. Greater green strength may be desirable in molding simple castings with flat surfaces. But it is a disadvantage in molding complex shapes, because the sand's flowability is too low to permit filling out or ramming sand into small, hard-to-get-at places. Castings with rough areas usually result.

Squeezer molds require sand of greater flowability, as a rule, because of their usually intricate mold cavities. Also, since squeezer molds are handled in smaller flasks, there is less concern about weight distribution, or suspension of sand within the mold.

It may be of interest to note that this foundry has experimented with green sand cores having a low content of diethylene glycol and a high content of bentonite and sulphur. Experiments proved the feasibility of green sand cores when handled by experienced molders.

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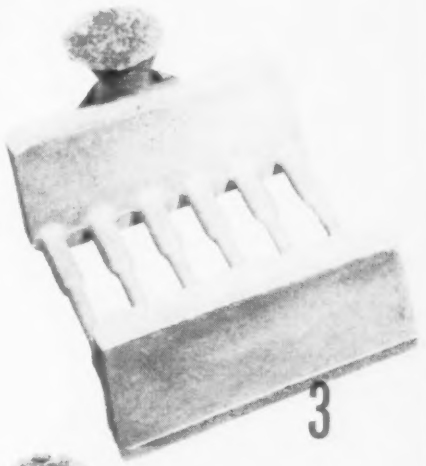
What are the inhibitor characteristics of diethylene glycol, sulphur and boric acid in magnesium molding sand? To find out, magnesium test bars were cast in sands carrying only one of each element. These photos of the test bars and risers show the results.

1. Use of diethylene glycol (1 per cent) as inhibitor resulted in pock marks on magnesium test-bar risers, indicating oxidation. Usual inhibitors were left out of silica sand, which contained 5 per cent bentonite and 2.5 per cent water.

2. Pock marks are minimized but are still present when sulphur (2 per cent) is used by itself as inhibitor. Silica sand contained 5 per cent bentonite and 2.5 per cent water.

3. Pock marks are reduced still more when boric acid (2 per cent) is substituted for sulphur as inhibitor. Silica sand contained 5 per cent bentonite and 2.5 per cent water.

4. Risers of test bars show clean finish as result of using 2 per cent sulphur and ¼ per cent boric acid, eliminating oxidation. Lower boric acid content is sufficient when used in combination with 2 per cent sulphur. Silica sand also contained 5 per cent bentonite, 1 per cent diethylene glycol and 2.5 per cent water.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QUESTIONS

Wants information on coke storage bin . . . . . .

Troubled with blows . . . . . Pouring temperature

Shrinkage difficulty . . . . . Cause of cold shuts

Bin for the Storage of Coke

QUESTION We shall be glad to receive information about the building of a coke bin of 100 tons capacity and about the construction of the mouth of the bin.

ANSWER Approximately 7000 cu ft will be required to store 100 tons of coke. A bin 16 x 20 x 22 ft would meet your requirements. We would suggest that it be built high enough off the ground so that hoppers with sloping bottoms will have adequate clearance. Also, you should make sure that you have an adequate number of hoppers. Vibratory-type pan feeders, belt feeders or a double clam shell can be used at the hopper to discharge the coke. Exact shape and slope of the bin, construction and details of the hopper will depend on your existing installations and material handling methods and should be engineered to your specifications.

Casting Hardness Is Too High

QUESTION We are making, by the shell mold process, a casting 4 in. diam and 9 in. long with a ¾-in. cored hole through the center of the casting. The casting weighs 25 lb; brinell specifications are 175 to 185. Silicon is 1.90 to 2.00; P, 0.60 to 0.70; Mn, 0.40 to 0.50, and S, 0.08 to 0.10. Trouble is that the brinell runs from 200 to 230. We find that satisfactory brinell is held if castings are bedded down in sand immediately after shakeout (castings are bright red) for 15 hours. In order to eliminate bedding down, at what temperature can castings of this size be shaken out without surface chilling?

ANSWER Your castings will not surface chill if they are shaken out after they turn dark. However, we do not believe that a surface chill is the cause of your problem as surface chill should not be present at any shakeout temperature below 1400° F. The slow cooling that the bedding down gives is probably decomposing the pearlite and thus reducing brinell readings.

You can reduce the brinell readings by increasing the carbon, silicon or by adding graphitizing agents. Your brinell specification seems extremely narrow and we doubt if it can be maintained without the long bedding down period. You might investigate the possibilities of having your customer change the brinell or composition.

Insert Parts Cause of Blows

QUESTION We are making brass swivel fasteners, and are having considerable difficulty with blows as shown by the accompanying specimen. Can you suggest a way to eliminate the trouble?

ANSWER Two possible causes of the blows are condensation of moisture on the insert portion due to a combination of warm sand and cold part, or presence of oily matter on the insert. We suspect from the bright, shiny appearance of the blow and dark appearance of part of the insert that it came in contact with oil.

Lack of cleanliness causes blows

Solid metal must be clean and dry to prevent blows when molten metal contacts it. If the inserts are much colder than the sand and are allowed to remain in the closed mold for some time before pouring, moisture condensation will take place. We believe that the clean inserts can be cast-in without trouble from welding or burning-in; if not, the inserts can be coated with a thin clay wash or blacking, and then dried thoroughly before being placed in the mold.

Pouring Temperature of Metal

QUESTION We are very much interested in obtaining information on the correct temperature for melting and pouring aluminum and nickel silver, and also whether the sand should be wet or dry.

ANSWER Correct pouring temperature of any metal or alloy is that which will run the castings full, and produce sound, dense castings. Hence, it has to be determined by experiment. Usually since several castings are poured from one pot or ladle of metal, and the metal in the ladle is losing temperature during the pouring period, actual pouring temperature extends over a range. That is, the metal at beginning of pouring must be higher by an amount sufficient to permit the last metal in the pot to produce a good casting.

Since nonferrous metals and alloys tend to pick up gases during melting, and this pickup increases with increasing temperature, good practice is to melt at the lowest possible temperature. While this might seem to indicate it would be satisfactory to take the pot from the furnace when it has reached the pouring range, it is not true. Metal usually has to be skimmed and carried to the mold side, and during that period it loses temperature. Therefore, allowance must be made for the temperature drop.

Pouring temperatures usually are based on section thickness since the volume-area relationship establishes the rate at which the metal cools. Thin sections, because of small volume and large surface area, cool rapidly. To counteract this, the metal must be hot to maintain it in liquid form. As the section becomes chunkier, the cooling rate becomes slower and the metal need not be as hot.

Hence, we can only suggest pouring ranges for the two alloys you mention. Some aluminum castings with heavy sections may be poured at 1200° F while some with extremely thin sections may require a temperature as high as 1500° F.

However, the general range is between 1250 to 1350° F. Pouring temperatures of nickel silvers will depend upon the nickel content—the higher the nickel, the higher the pouring temperature. For example, that containing around 12 per cent nickel may be poured between 2050° for heavy and 2300° F for light; the 16 per cent nickel alloy at 2150 to 2400° F; the 20 per cent nickel alloy at 2200 to 2500° F while the 25 per cent nickel alloy may be poured between 2350 and 2600° F.

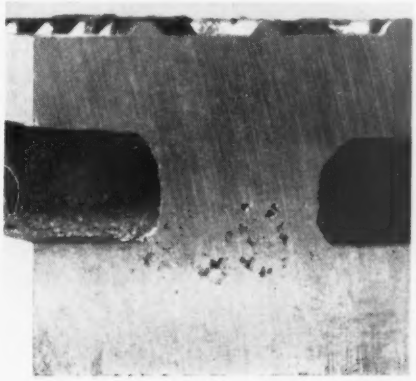
Your reference to the sand being wet or dry is not clear to us. Moisture content of green molding sand should be maintained around 7 per cent. If the sand is too dry, it is difficult to ram and tends to drop out and wash, and if too wet causes blows on castings.

Has Trouble with Shrinkage

QUESTION We are sending you a drawing of a steam jacket valve showing, as indicated by the heavy dash lines, where the accompanying section was cut from one of the castings. As you will note, small holes appear in the 1-in. post between the upper and lower sections. We made quite a number of these without the post and had no trouble. However, the purchaser decided to increase the operating pressure, and as a precaution included the post. Since then we have had nothing but leakers. Castings leak through the bottom at the post section. Iron contains 1.68 per cent Si, 0.57 per cent Mn, 0.448 per cent P, 0.133 per cent S, and 3.12 per cent TC. Casting is gated with two gates as indicated on lower flange, with a riser off the side of the top flange. Sides of the casting are formed in cores, with molding sand top and bottom.

ANSWER The small holes in the post section area of the casting are the result of shrinkage, and the remedy is to see either that feed metal gets into that area or that the rate of solidification is increased to that of the adjoining areas. Possibly the trouble may be overcome by enlarging the gates—increasing the depth or thickness to about that of the flange to which they are attached. Letters on the top of the casting above the area involved eliminate use of a riser at that point.

If your present gating system is as thick as suggested, then you will have to resort to increasing the rate of solidification in the post section. Several procedures are available. One is to use a chill in the drag. One slightly larger than the diameter of the post should suffice, but be sure that it is clean and dry. Another method would be to use a coil chill, with the stem inserted in the drag, and the body extending up into the post section. One objection to the latter might be the stem's showing on the machined bottom of the casting, and slight possibility of leakage if the stem did not fuse properly. To overcome those objections, the stem of the coil chill can be bent at a right angle, and inserted into the interior core sufficiently that the body of the chill centers in the post.



Should increase the cooling rate

Desires a Permanent Flatback

QUESTION We are setting up an ornamental aluminum casting commonly known in the foundry trade as a "flatback." We would like to know if there is any possibility of having a permanent drag to save the labor of repeatedly producing the flatback drags. Casting is to be made in the cope in a snap flask. Alloy is the common No. 12.

ANSWER While you may have reasons for making this ornamental casting in the cope, we believe you will be much better off to follow the sound foundry practice of making the casting face-down in the drag. That will insure less trouble with various defects on the face of the casting. Use a fine sand such as Windsor Locks or comparable to provide as smooth a surface as possible, and provide sufficient gates to eliminate any drawdown or shrink spots on the back of the casting. Cope, of course, would be a flatback.

Various types of permanent flatbacks could be used, but we believe that all would be more expensive than squeezing up a flatback in green sand. For example, you could use cast iron plates. These would have to be purchased, and the plates would have to be coated with some type of refractory wash or paint. Another possibility would be employment of slab cores.

Aluminum Causes Cold Shuts

QUESTION We are enclosing a small piece of a brass casting on which we encounter cold shuts, and it shows the typical discoloration when we have the trouble. Actual analysis of the brass shows 67.34 per cent Cu, 0.52 per cent Sn, 2.44 per cent Pb, 29.12 per cent Zn, 0 01 per cent Al, 0.43 per cent Fe, 0.10 per cent Si, 0.036 per cent S, and nil Mn. At times Cu will run 5 to 7 per cent higher with decrease in Zn. Brass is melted in an oil-fired crucible furnace, is fluxed with a standard brass flux, and taken from the furnace at 2200° F.

ANSWER Your basic problem is to adjust the aluminum content of the brass to a level where it will give the desired increase in fluidity without causing the trouble mentioned. Yellow brass without aluminum comes out of the sand with a red color, but due to the strong effect of zinc oxide on the metal stream, fluidity or castability is lower than usually desired. With aluminum addition the brass becomes much more fluid. It can be poured at lower temperature, will fill the molds sharply, and produce less zinc smoke in the foundry. In addition, when the amount of aluminum added is correct the cast-

ings have a pleasant golden color.

Golden color is a good indication of the amount of aluminum present. If too little, the oxide film is thin, usually found in patches, and frequently is the cause of misruns or cold shuts since it impedes metal flow and cohesion. If too much, the oxide film becomes thicker and tends to form a barrier. Long experience in handling yellow brass indicates that the optimum addition of aluminum is about 0.2 per cent. With less aluminum added, thin films which frequently cause cold shuts are found, also incomplete or patchy yellow color on the castings. With more than 0.2 per cent aluminum, the film becomes visibly thicker, nonuniform and more silvery in color.

In your case analysis of the brass indicated 0.01 per cent aluminum, which is inadequate to increase fluidity; it is likely to produce cold shuts through trapping of the thin oxide films. Evidently, you are purchasing ingot with aluminum present and not adding any. Since it is extremely difficult to control aluminum additions when some is present in the ingot, it is preferable to buy aluminum-free ingot and add the previously suggested amount just prior to pouring. Principal benefits of aluminum additions are realized when they are made as indicated by plunging beneath the surface. On remelting gates and risers a certain amount oxidizes, and usually no trouble is encountered on build-up if the additions are maintained at 2 oz per 100 lb brass.

Suggest Chill Test Proceedure

QUESTION We would like to have some information on a good chill test procedure for use in conjunction with pouring low alloy iron against chills. We are particularly interested in the following: 1. Size of bar to be poured. 2. Length of time test bar should be in sand against chiller. 3. Best method for cooling test bar prior to breaking for observation of chill effect. 4. Any other details which you think would be helpful to us in setting up this procedure.

ANSWER Test blocks 3 in. long, 1½ in. high, and tapered from 5/16 at the bottom to 7/16-in. at the top, made in a dry sand core, have been used with good results. We suggest that you start with this size. Should you experience any difficulty in correlating your chill test results with your castings you might try other sizes of test blocks as described in ASTM "Tentative Methods of Chill Testing of Cast Iron." The block may be notched 1/16-in. for ease in breaking. A pouring basin should be provided so that the metal is not poured directly against the chill plate.

The test bar need be left in the sand only until it is cherry red—approximately two minutes—and may then be quenched in water. Make sure that the edge farthest from the chilled edge is inserted in the water first. The test block should be held by the tongs at one end away from the area where the block is to be broken.

It is necessary to pour all test blocks at the same temperature if useful results are to be obtained. You will probably find it necessary to place a weight on top of the core to hold it down while pouring. The opening in the core must be free of sand fins and must set flat on the chill plate. The chill plate may be made of cast iron, steel, copper or graphite. The plate must be machined and kept clean and free from fire cracks. A wire brush may be used to clean the chill plate after each pouring. The chill plate temperature must not exceed 500° F.

Seeks Information on Cupola

QUESTION We are contemplating the installation of a 36-in. cupola in our foundry and would like information on tuyeres, air required, lining, etc. We are figuring on front slagging, and would like to know how deep the well should be. Cupola will be charged mechanically, so what should be the depth of the sand bottom? Also what is the best bed height?

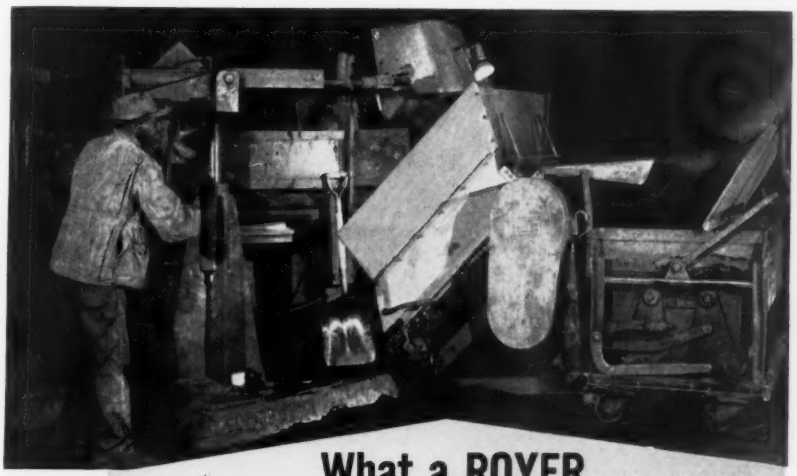
ANSWER By purchasing a cupola from any of the manufacturers of such equipment, information on the several questions you raise would be supplied as part of the service. In general, a 50-in.-diam shell is lined down to 36 in. by use of 2½ x 4½ x 9-in. firebrick and 4 x 6 x 9-in. cupola block. The firebrick are laid against the shell with the long dimension vertically and the flat side facing the shell. Such a

(*Concluded on page* 144)

"Oh no, you can't mean it—we ain't bustin' that up for scrap???"

MULLING IS ONLY HALF THE JOB---

Finish it with a ROYER



Model NYS-E with a 9 ft. muller.

What a ROYER will do for your Mulled Sand

1. Increase permeability.
2. Increase flowability.
3. Eliminate all clay balls.
4. Provide a final complete mixing.
5. Double aerate the sand.
6. Speed cooling by fluffing, open discharge stream and open heap.
7. Assure a light, fluffy texture.

The mulling operation, designed to coat sand grains with certain additives by the mechanical process of kneading, is an essential one for good sand control. However, this action results in pressing and packing the sand grains together and the added bonding materials tends to hold the sand in a dense state. Sand properly prepared for molding should be open and fluffy, to allow for good flowability and the escape of gases. Sand discharged from ANY muller needs to be aerated . . . with a ROYER . . . the only machine large enough to handle the instantaneous discharge from large mullers; the only machine which fluffs and cools as it aerates.

Install a Royer directly under your muller discharge or later in the system, if more convenient. Two models are recommended for this application, depending upon capacities desired—the NRS, 40 to 60 tons per hour or the NYS, 120 to 180 tons per hour. With the addition of a Royer no time is added to the cycle of sand preparation and, for a fraction of a cent per ton, the quality of your sand will be improved many times over. Write for complete details.

A Model NRS in a Massachusetts foundry.

Foremost in Sand ROYER *Conditioning Equipment*

ROYER FOUNDRY & MACHINE CO. 159 PRINGLE ST. KINGSTON, PA.

(*Concluded from page* 142)

cupola may have six tuyeres 4 x 7½ in. or eight tuyeres 4 x 5½ in. Height of the cupola from bottom plate to charging door should be 18 to 22 ft, and the bottom plate should be at least 6 ft above floor level.

Bottom of the tuyeres usually is 24 to 26 in. above the bottom plate. A 4-in.-thick sand bottom at the spout sloping up to 6 in. at the back will leave a well about 20 in. deep. However, with a front-slagging type cupola from which the iron and slag emerge continuously, the tuyere height above the sand bottom can be decreased to 10 or 12 in. Coke bed height for a 36-in. ID cupola may range from 40 to 46 in.; the most suitable height should be determined by experiment. It should melt about 4 tons an hour, and based on an iron to coke ratio of 8 to 1, the amount of air supplied should be around 2270 cu ft per minute.

Wants Increased Melting Rate

QUESTION We originally had a 36-in. OD cupola on which we recently enlarged the section below the charging door to 50 in.—lining with 6-in. brick. We get good iron about 3 to 4 tons per hour with the present setup, but we wonder if the melting capacity will be increased if we enlarge the cupola all the way to the top. We have sufficient air volume for a larger cupola.

ANSWER Increasing the size of the cupola above the charging door will have no effect on the melting rate, but we believe that it should be enlarged to the size of the lower section from a safety and health viewpoint. The change in diameter from a 51-in. shell lined with 6-in. brick to a 36-in. lined with 4-in. brick amounts to a reduction of about 48 per cent in cross-sectional area. There is a possibility that the sharp change in diameters of the lower and upper sections might lead to some expulsion of gases through the charging door into the charging platform area, and cause a health hazard.

As far as melting rate is concerned, we would expect a cupola lined to 38 in. to produce about a ton per hour more than what you mention. Since we do not know what your present practice is, we can only offer suggestions which might be followed. For example, the bed height may range from 40 to 46 in. above the tops of the tuyeres—the most suitable distance being determined by experiment. Coke charges should be 100 lb with an iron charge of 800 lb. Assuming that the melting rate will be 4½ tons per hour, the volume of air to be supplied will be 2550 cu ft per minute.

Specifications for Gray Iron

QUESTION Would you please send a list of ASTM and SAE standard numbers, indicating what they represent or what qualifications gray iron castings must have to meet these requirements? Many of our blueprints call for a certain ASTM or SAE number and we have no handy list or chart which could give this information to us quickly.

ANSWER The information you are seeking is given in detail in SAE standards and ASTM specifications A 48-48, A159-53 T and A 190-47. The main requirement is the tensile strength of test bars. ASTM specification A190-47 is for lightweight and thin-sectioned castings and covers castings in which strength is not a primary consideration. No minimum tensile strength is required.

ASTM specification A 48-48 lists these seven classes:

Class	Tensile Strength min., psi
No. 20	20,000
No. 25	25,000
No. 30	30,000
No. 35	35,000
No. 40	40,000
No. 50	50,000
No. 60	60,000

Specific chemical analyses are not required.

ASTM specifications A 159-53 T and SAE specifications use the same numbers.

Number	Brinell Hardness Number	Tensile Strength min., psi
110	187 max.	20,000
111	170-223	30,000
120	187-241	35,000
121	202-255	40,000
122	217-269	45,000

Numbers 113 and 114 are specifications for brake drums and clutch plates and require specific chemical, tensile and structural properties. For futher information on these irons we suggest that you obtain a copy of either the SAE or ASTM specification. You will find that the specification A 48-48 includes information on casting of test bars and their testing.

Porosity in Cylinder Heads

QUESTION We operate a foundry in Spain and recently received an important order for gray iron cylinder heads for diesel engines. Design and material specifications have been given to us by a prominent manufacturer with great experience in the field. However, we know of another foundry which furnished such castings a couple of years ago and experienced serious losses through rejections. Trouble was encountered from irregularly distributed porous areas localized around the fuel injection ports. Can you suggest means of preventing that? Also we would like to know what the percentage of scrap is for similar work in the United States.

ANSWER We regret that we cannot supply any information on losses in production of diesel cylinder heads since foundrymen are the same the world over—they do not discuss their losses publicly.

Your reference to porosity appearing around the fuel injection ports of the cylinder head casting indicates that the difficulty is the result of improper gating and heading—in other words, insufficient feeding. If the porosity were due to cores, the trouble would not appear in one specific area at all times.

You do not indicate whether or not the injection port sections are solid or cored out. Preferably they should be cored to reduce the thickness or rather to provide more uniform sections and, hence, uniform solidification. If solid, the section is difficult to feed since the thinner section of the top or bottom face of the head, through which feeding occurs, tends to freeze before the heavy port section. Even though a riser may be placed over that section, it may be so far from the gate that the metal is relatively cold when it arrives in the riser and hence does little effective feeding. Possibly use of a neckdown or cut-off core at the bottom of the riser or use of an exothermic sleeve might result in better feeding of the casting.

just right for synthetic molding!

Juniata

TRADE MARK REGISTERED

the UNIVERSAL FOUNDRY SAND

JUNIATA Bank Sand, the universal foundry sand, has a natural priming coat which readily takes clay bond and mixes easily. It permits hard ramming, produces sharper profiles and makes an ideal facing sand base.

JUNIATA, as a molding sand, retains the desirable features of a natural sand; at the same time, having ample permeability, it assures finer finished castings.

JUNIATA, as a shell molding sand, has the required physical qualities and right grain pattern.

JUNIATA Bank Sand is available either raw or artificially dried in several grades ranging from AFS 85—110.

MOLDING SANDS
SHELL SANDS
SILICA SANDS
BLAST SANDS
BENTONITE
RE-BONDING CLAYS
FIRE CLAYS
REFRACTORIES
SHOT
GRIT
ABC COKE

GREAT LAKES FOUNDRY SAND CO.

UNITED ARTISTS BUILDING, DETROIT, MICHIGAN

MEN OF INDUSTRY

B. D. CLAFFEY
. . . Ohio Malleable manager

ARTHUR J. MILLER JR.
. . . heads Chicago Wheel Co.

JOHN M. ROBB JR.
. . . joins Pennsylvania Sand

WALTER R. FRY
. . . joins Slinger Foundry

B. D. CLAFFEY has joined Dayton Malleable Iron Co., Dayton, O., as general manager of its Ohio Malleable Division, Columbus, O. Mr. Claffey was formerly president, Acme Aluminum Alloys Inc., Dayton, O. Prior to that he organized Claffey Castings Co., Waukesha, Wis., which became the gray iron division, General Malleable Corp., with Mr. Claffey as vice president-general manager. At Dayton Malleable he will also have general charge of an expanded research and development program to be carried on at a central laboratory located in three buildings, formerly part of the West Third St. plant in Dayton. **L. C. Crome** continues as director of Dayton Malleable's metallurgical research laboratory. **H. R. Saurer** will co-ordinate pilot plant operations at the central laboratory and also at the company's operating foundries, which are located in Dayton, Columbus and Ironton, O., and at Buffalo.

♦ ♦ ♦

Joseph A. Wohlschloeger was recently appointed plant engineer, Misco Precision Casting Co., Whitehall, Mich. Until recently he was associated with Ohio Steel Foundry Co., Springfield, O., in that capacity. Previously he was assistant plant engineer, Weldon Springs Ordnance Plant, Weldon Springs, Mo.

♦ ♦ ♦

Harold J. Mock has been appointed executive vice president, General Metals Corp., San Francisco, and general manager of its Adel Precision Products Division, Burbank, Calif. Before going to California in 1950 Mr. Mock was director of industrial engineering, Ford Motor Co., Dearborn, Mich.

Arthur J. Miller Jr., until recently treasurer-factory manager of the Valparaiso, Ind., plant, Chicago Wheel & Mfg. Co., Chicago, has been named president-general manager of the company, succeeding his father, **A. J. Miller Sr.,** who has become board chairman. Other officers elected include: **Henry E. Miller,** vice president-general production manager; **Henry M. Mann,** treasurer-chief of sales engineering; and **Arthur T. Dalton,** secretary-general sales manager. **I. Danielson,** elected vice president emeritus, continues as advisor on financial matters.

♦ ♦ ♦

Richard S. Smith Jr., has been appointed public relations director, Central Foundry Division, General Motors Corp., Detroit, covering plants in Saginaw, Mich., Defiance, O., and Danville, Ill. Mr. Smith attended Cleary College and joined the company in 1932. He became personnel director at the Saginaw Malleable Iron Foundry in 1951 and in 1953 was named salaried personnel director for Central Foundry Division of General Motors.

♦ ♦ ♦

H. Owen Jones has been elected president, Manitoba Steel Foundries Ltd., Selkirk, Man., recently acquired by Vulcan Iron & Engineering Ltd., Winnipeg, Man. Mr. Jones is vice president-general manager of Vulcan Iron, subsidiary of Bridge & Tank Co. of Canada Ltd., Hamilton, Ont.

♦ ♦ ♦

Gen. Walter Bedell Smith has been elected vice chairman of the board of directors, American Machine & Foundry Co., New York. Gen. Smith retired recently as Under Secretary of State.

John M. Robb Jr. and **Lawrence R. Tierney** have been appointed vice presidents, Pennsylvania Foundry Supply & Sand Co., Philadelphia. Mr. Robb, for many years resident manager in Philadelphia for Hickman, Williams & Co., is a charter member of the Philadelphia Chapter of the AFS and a former director of its national organization. Mr. Tierney has been associated with Pennsylvania Foundry Supply & Sand Co. since 1947 as sales representative in eastern Pennsylvania.

♦ ♦ ♦

Walter R. Fry, formerly superintendent and consultant, Guilford Foundry Co., Greensboro, N. C., has been named general superintendent, Slinger Foundry Co., Slinger, Wis. Previous associations include Bohn Aluminum & Brass Corp., South Haven, Mich., G & C Foundry Co., Sandusky, O., and Bassick Co., Winston-Salem, N. C.

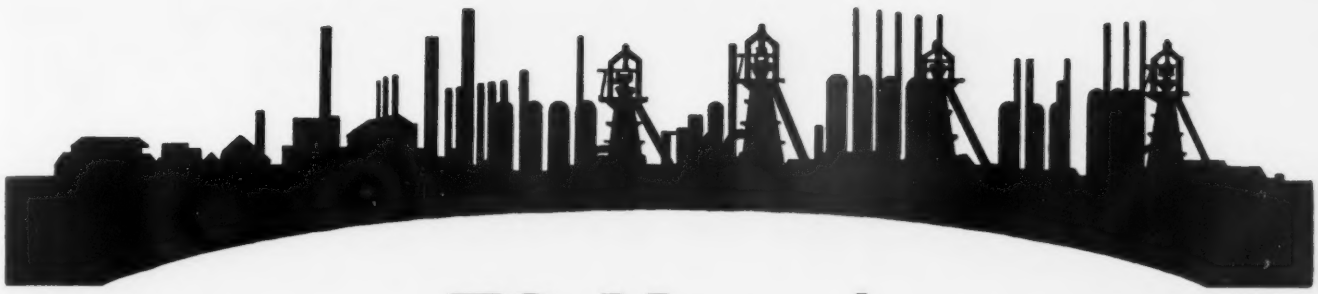
♦ ♦ ♦

Robert E. W. Harrison has been appointed director of special engineering projects, Sintercast Corp. of America, Yonkers, N. Y., to aid in development of refractory carbides and powder metal parts as applied to industrial and military uses. Mr. Harrison was recently retired as an engineer captain, United States Navy. He is a fellow of the American Society of Mechanical Engineers.

♦ ♦ ♦

E. Q. Sylvester, executive vice president, Griffin Wheel Co., Chicago, has been named to receive the Melville Prize Medal of the American Society of Mechanical Engineers for his paper, "Pressure Pouring Steel Car Wheels in Permanent Molds,"

(*Continued on page* 148)



72 Years' Cumulative Experience in Making UNIFORM, QUALITY IRON

In any field, experience is a valuable factor. Producing pig iron is no exception. The modern Woodward pig—dependably uniform in size, shape and analysis—is a product of 72 years of unceasing effort to produce quality iron for all requirements of the foundry trade.

We invite your inquiries.

For quotations, write or call our
Sales Department, Woodward, Ala.

Phone Bessemer, Ala. 5-2491

or Sales Agents for territory north of Ohio River:
HICKMAN, WILLIAMS & COMPANY with Sales Branches at—

609 Bona Allen Building, Atlanta 3, Ga.; 230 North Michigan Avenue, Chicago 1, Ill.; First National Building, P. O. Box 538, Cincinnati 1, Ohio; 1154 Union Commerce Building, Cleveland 14, Ohio; 1203 Ford Building, Detroit 26, Mich.; P. O. Box 335, Duluth 1, Minn.; 412 Guaranty Building, Indianapolis 4, Ind.; 407 Foshay Tower, Minneapolis 2, Minn.; 70 Pine Street, New York 5, N. Y.; 1500 Walnut Street Building, Philadelphia 2, Pa.; 1910 Clark Building, Pittsburgh 22, Pa.; 796 Arcade Building, St. Louis 1, Mo.

Woodward Iron Company

WOODWARD, ALABAMA

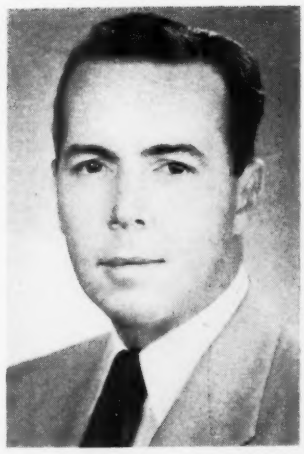
Independent Since 1882

MEN OF INDUSTRY

CHARLES R. GARFIELD
. . . Pittsburgh sales, Norton

ROBERT C. DIVOLL
. . . abrasive engineer, Norton

CHARLES M. WELLONS
. . . Norton field engineer



LLOYD H. CANFIELD
. . . Mo-Kan Chapter chairman

(*Continued from page* 146)
presented at the 1953 annual meeting of the society. Award will be given at the 1954 annual meeting in New York, Nov. 29-Dec. 3.

♦ ♦ ♦

Edward F. Peck has been named advertising and publicity manager, Continental Foundry & Machine Co., East Chicago, Ind., at the company's publicity offices in Pittsburgh. A graduate of University of Pittsburgh, Mr. Peck for 10 years has done advertising and promotional work for Westinghouse Electric Corp., Pittsburgh.

♦ ♦ ♦

Charles E. Vanderpool, since 1947 sales promotion and advertising manager, Rotor Tool Co., Cleveland, has been appointed sales manager for the company. Mr. Vanderpool attended University of Pittsburgh and Carnegie Institute of Technology and from 1939-1943 was Pittsburgh district manager, Cleveland Pneumatic Tool Co., Cleveland. He was sales manager there until 1947.

Charles M. Wellons, formerly Philadelphia district field engineer, Norton Co., Worcester, Mass., has been named abrasive engineer in the Philadelphia area, formerly represented by the late A. Watson Gough. **Robert C. Divoll,** previously Pittsburgh field engineer, has been appointed abrasive engineer to cover part of the Pittsburgh area. **Charles R. Garfield,** recent graduate of the company's sales training course, has become Pittsburgh district field engineer.

♦ ♦ ♦

G. A. Andree has been named general sales manager, Shaw-Box Crane & Hoist Division, Manning, Maxwell & Moore Inc., Muskegon, Mich. Mr. Andree joined the company 24 years ago and in 1938 became field sales engineer for the Shaw-Box organization. Three years later he became Pittsburgh district manager and in 1948 was named assistant general sales manager in Muskegon, where he subsequently directed engineered crane sales.

Lloyd H. Canfield, elected chairman of the Mo-Kan Chapter of the AFS for 1954-55, is owner of Canfield Foundry Supplies & Equipment, Kansas City, Kans., which he organized in 1948. Mr. Canfield was graduated from University of Kansas City, and after 4 years of Navy service spent a year in his father's business, Fred Canfield Foundry Sands. From 1946-1948 he was report supervisor, Dun & Bradstreet Inc., in Kansas City. He was vice chairman of Mo-Kan Chapter last year.

♦ ♦ ♦

Fred R. Young, E. A. Wilcox Co., Seattle, and secretary of the Washington Chapter of the American Foundrymen's Society, was recently elected president of the Manufacturers' Agents National Association.

♦ ♦ ♦

William R. Rudolph and **James W. Frederick** have been appointed abrasive engineers, Bay State Abrasive Products Co., Westboro, Mass. Mr. Rudolph, formerly president, Robert

(*Continued on page* 150)

CHARLES E. VANDERPOOL
. . . sales mgr., Rotor Tool

G. A. ANDREE
. . . Shaw-Box sales mgr.

WILLIAM R. RUDOLPH
. . . joins Bay State Abrasive

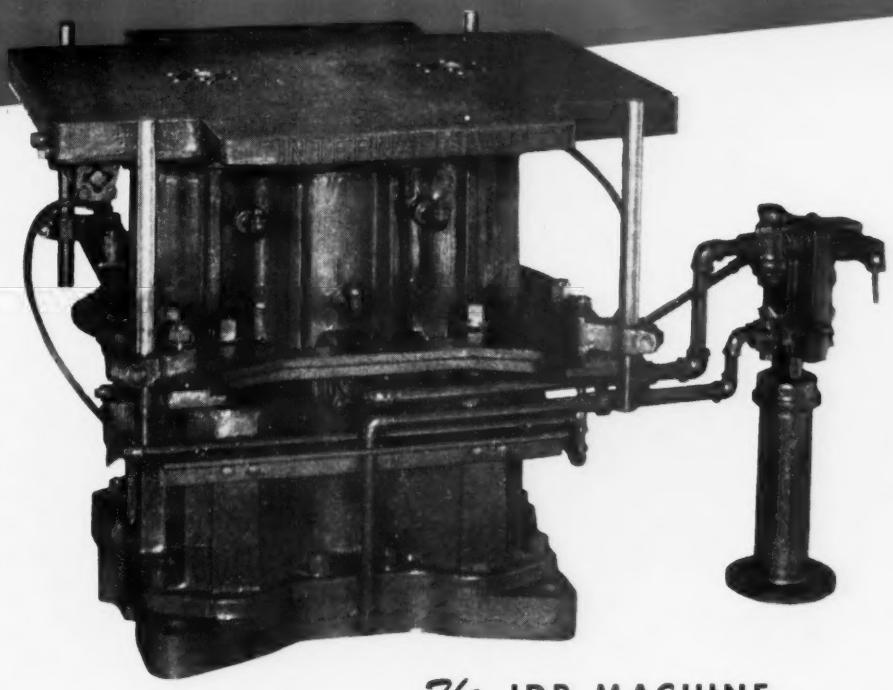
JAMES W. FREDERICK
. . . Detroit sales, Bay State

INTERNATIONAL TYPE

JDP MACHINE

The JDP has the exclusive Double Jolt Feature. A **Positive** Jolt and a **True** Ram.

TWO JOLT SECTIONS combined in one integral unit.



The JDP is adaptable to a large range of work, suitable to the pin lift style. It is readily adjustable. The incorporation of the Double Jolt Feature, combined with the sturdiness of the machine, gives a positive ram throughout the mold.

The lifting section is guided by hardened steel parts for long lasting wear. All valves are conveniently located for ease of operation. Wearing parts can be readily replaced.

The **JDP MACHINE**

by

INTERNATIONAL

International Molding Machine Company • La Grange Park, Illinois

MEN OF INDUSTRY

JOHN COOK
. . . retires, Norton Co.

M. R. TENENBAUM
. . . Lester Phoenix sales

L. R. FARRELL
. . . Lindberg Engineering sales

CHARLES E. PETERSON
. . . chief metallurgist

(*Continued from page* 148)

Rudolph Tool Co., St. Louis, will cover Missouri, Kansas, and southern Illinois, with headquarters in Chicago. Mr. Frederick has been assigned to the Detroit area, in the branch office there. For the past 7 years he has been associated with the Carborundum Co., Niagara Falls, N. Y.

♦ ♦ ♦

John Cook has resigned as grinding department foreman, Norton Co., Worcester, Mass., after 43 years with the company. Engaged in sales for many years, he served as district manager in Philadelphia and Syracuse, N. Y., more recently specializing in perfecting grinding equipment. **Stewart O. Bailey** has succeeded Mr. Cook, after 17 years with the company as grinder operator, instructor and assistant foreman.

♦ ♦ ♦

Edward A. Loria has been appointed staff metallurgist at the central metallurgical office, Crucible Steel Co. of America, Pittsburgh. A graduate of Carnegie Institute of Technology, Mr. Loria also did graduate work at University of Pittsburgh and Massachusetts Institute of Technology. He was formerly associated with the research and development department, Carborundum Co., Niagara Falls, N. Y.

♦ ♦ ♦

George H. Snyder, since 1943 vice president-sales, American Steel Foundries, Chicago, has retired from active duty but will continue in a consulting capacity. Mr. Snyder joined the company in 1920 as a sales agent in St. Paul. In 1941 he was transferred to Chicago as general sales manager. For over a year he has served also as vice president of the Transportation Equipment Division.

M. R. Tenenbaum has been appointed representative in the Michigan area, Lester Phoenix Inc., operating from the company's home office in Cleveland. A graduate of Case Institute of Technology, Mr. Tenenbaum, for 11 years has been chief metallurgist, Monarch Aluminum Mfg. Co., Cleveland.

♦ ♦ ♦

L. R. Farrell, for 12 years associated with Tocco Division, Ohio Crankshaft Co., Cleveland, has joined Lindberg Engineering Co., Chicago, to handle motor generator induction heating sales for its High Frequency Division.

♦ ♦ ♦

Robert G. Matters, since 1950 research supervisor, has become assistant director of research, Allis-Chalmers Mfg. Co., Milwaukee. He joined the company in 1934 after graduation from University of Wisconsin and, following 10 years as metallurgist, in 1945 became assistant superintendent of the chemical and metallurgical laboratories.

♦ ♦ ♦

Samuel W. Rinn has been appointed sales representative in Pittsburgh, General Machinery Division, Allis-Chalmers Mfg. Co., Milwaukee. **W. F. Bueche** has been named sales representative in Cleveland and **R. M. Thoman,** in Chicago. The men recently completed training courses for graduate engineers at company offices.

♦ ♦ ♦

W. T. Bosworth has been appointed manager of furnace and heat treating equipment sales, Salem-Brosius Inc., Pittsburgh. Mr. Bosworth, who for 25 years has directed Chicago district sales activities for George J. Hagan Co., recently acquired by Salem-Brosius, will have headquarters at the Hagan Division in Pittsburgh.

Charles E. Peterson has been named chief metallurgist, Mackintosh-Hemphill Co., Pittsburgh and Midland, Pa. He left the company last year to become sales and research metallurgist, Rolls Division, Blaw-Knox Co. Mr. Peterson was graduated from Carnegie Institute of Technology following Navy service. He was associated with U. S. Steel Corp.'s metallurgical department until 1949, when he joined Mackintosh-Hemphill as metallurgical assistant to the vice president-research and development.

♦ ♦ ♦

Dr. Otto Zmeskal, formerly professor and director of the Department of Metallurgical Engineering, Illinois Institute of Technology, Chicago, has been appointed research professor of the Department of Mechanical Engineering, University of Florida, Gainesville, Fla.

♦ ♦ ♦

John A. Wettergreen, works manager of the South Milwaukee, Wis., plant, Bucyrus-Erie Co., has been named general works manager, to direct plant activities in South Milwaukee, Erie, Pa., Evansville, Ind., and Chicago. He joined the company in 1930.

♦ ♦ ♦

Kermit S. Matz recently joined Emmaus Foundry & Machine Co., Emmaus, Pa., as foundry engineer to handle the company's line of pattern equipment, castings and machining service in the Philadelphia area.

♦ ♦ ♦

Keith E. Gilbert has been appointed metallurgist, Richmond Foundry & Mfg. Co., Richmond, Va. Mr. Gilbert attended Antioch College, Michigan College of Mines, and taught metallurgy for a year at University of Wisconsin from which he was

(*Concluded on page* 153)

In your mold wash, perfectly uniform Penn-Sand Silica Flour will always give you the same even coating and thickness of application. Its high fusion point and excellent refractoriness will reduce metal penetration, minimize surface defects and produce castings with super-smooth finish. For complete information and free samples, mail the coupon today to Pennsylvania Glass Sand Corp., leading producers of Quality Foundry Sands and Silica Flour.

"We depend on PENN-SAND Silica Flour"

And you can, too!

PENN-SAND

THE SURE START TO A PERFECT FINISH

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Two Gateway Center, Pittsburgh, Pa.

Please send me further information and sample of each PENN-SAND product checked below.

NAME _____

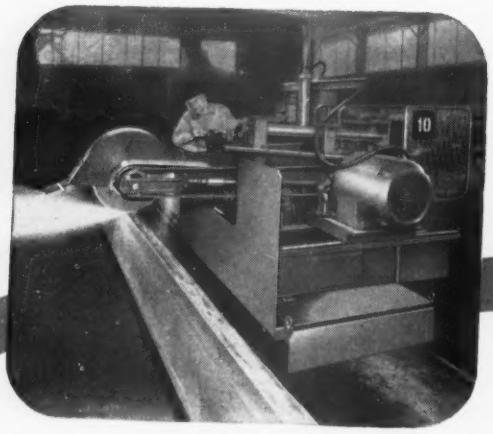
COMPANY _____

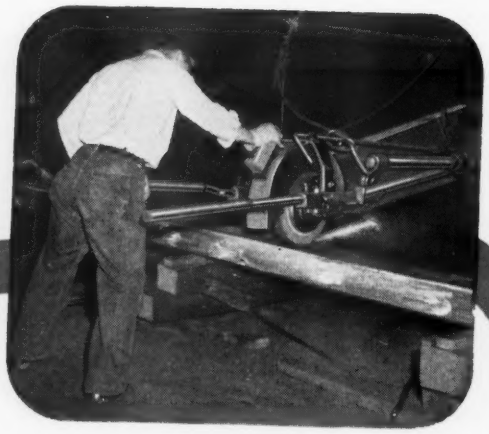
ADDRESS _____

CITY _____ STATE _____

☐ Molding Sand ☐ Core Sand ☐ Sandblast Sand
☐ Shell-Molding Sand ☐ Silica Flour

No matter what grinding method you use...





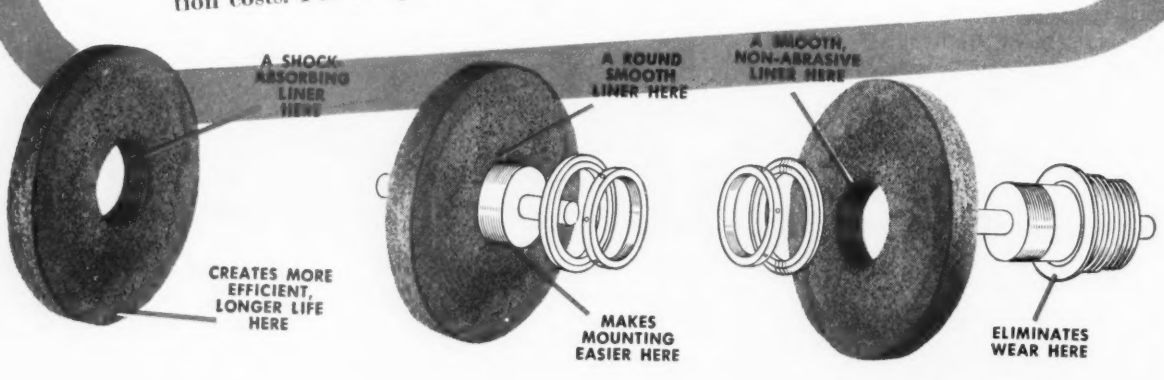
MID-WEST SNAGGING WHEELS ARE MORE EFFICIENT!

Here are the two big reasons for Mid-West's low-cost efficiency. They're ready to go to work for you!

1. Mid-West designed fiber-cushioned arbors minimize vibration. They're baked-in shock absorbers bonded in for life!

2. Mid-West snagging wheels' extra-tough bonds are designed especially for billet snagging, grinding of steel and alloy castings, and snagging operations on all types of non-ferrous metals and cast irons.

Here is real grinding efficiency that's bound to help you cut high production costs. For complete information—write, wire or phone today.


A SHOCK-ABSORBING LINER HERE
A ROUND SMOOTH LINER HERE
A SMOOTH, NON-ABRASIVE LINER HERE
CREATES MORE EFFICIENT, LONGER LIFE HERE
MAKES MOUNTING EASIER HERE
ELIMINATES WEAR HERE

MID-WEST ABRASIVES

Executive Offices:
510 South Washington St., Owosso, Mich.
Factories: Owosso, Mich. • Rochester, Penna.

JOHN E. FRIES JR.
. . . *Brake Shoe metallurgist*

CLARENCE G. BIEBER
. . . *alloys research, INCO*

JEAN S. MURPHY
. . . *Shallway Corp. sales*

ROBERT L. WEIDMAN
. . . *Cooper Alloy sales*

(*Concluded from pages* 150)
graduated in 1946. Since 1947 he has been foreman, Belle City Malleable Iron Co., Racine, Wis.

♦ ♦ ♦

John E. Fries Jr. has been appointed chief metallurgist, National Bearing Division, American Brake Shoe Co., New York. He joined the company in 1949 after graduation from Massachusetts Institute of Technology. Mr. Fries will continue to be located at National Bearing Division's Meadville, Pa., branch, where he has been plant metallurgist.

♦ ♦ ♦

Alfred Sugar, formerly aluminum division plant manager, American Metal Co. Ltd., New York, has been appointed vice president-technical director, Alloys & Chemicals Mfg. Co., Cleveland. Mr. Sugar was graduated from Case Institute of Technology. Previous connections included Thompson Products Inc. and Monarch Aluminum Mfg. Co., Cleveland, and U. S. Reduction Co., East Chicago, Ind. Author of many technical papers, Mr. Sugar is active in committee work with ASTM, ASM and AFS.

♦ ♦ ♦

E. A. Bergman, U. S. Reduction Co., East Chicago, Ind., was recently elected president, Aluminum Smelters Research Institute, Chicago. Other officers elected at the annual meeting are: **A. Nichamin,** Federated Metals Division, Detroit, vice president; **J. M. Stone,** Aluminum Smelting & Refining Co., Bedford, O., treasurer. **Carl H. Burton** continues as secretary.

♦ ♦ ♦

Joseph Prendergast, who has been serving as foundry consultant with the United States Foreign Operations Organization in Rome, recently returned to the United States after 4 years of service.

Clarence G. Bieber has been appointed head of the Special Alloys Section of the Bayonne, N. J., Research Laboratory, International Nickel Co., New York. Mr. Bieber, who received his technical education at University of Wisconsin, joined the company's Huntington, W. Va., Works in 1924 and since 1939 has been works metallurgist.

♦ ♦ ♦

Jean S. Murphy has been appointed eastern sales-service representative, Shallway Corp., Connellsville, Pa. Mr. Murphy has had considerable experience in shell molding practice.

♦ ♦ ♦

Walter J. Hulsey has been named manager of the Conveyor Division, Jeffrey Mfg. Co., Columbus, O., and Birmingham. **J. Thomas Berg** has joined him there as sales engineer. **Howard S. Davies** has become Pittsburgh district manager for the division and **James B. Green** has succeeded Mr. Davies as Chicago district manager. **E. E. Balduff** has been transferred to the Jacksonville district office as sales engineer with headquarters in Orlando, Fla. **Travers W. Nelson** has become district office manager in Jacksonville. **William A. Cheney** has been appointed New York district sales engineer. **Vernon L. Ekblad** has been named General Engineering Sales Division engineer in Houston, Tex. **Robert F. Farrell** has been appointed sales engineer in Columbus, succeeding **Robert D. Henning,** who has become sales engineer in Products Engineering Division, there. **Robert M. Dunn** has been appointed Knoxville, Tenn., sales engineer. **George S. Kepley** has been transferred from coal preparation engineering sales in Columbus to Pittsburgh, as has been **Edward G. Braun,** formerly in the Buffalo office.

Robert L. Weidman has been appointed sales representative in the Mid-Atlantic states, Cooper Alloy Corp., Hillside, N. J. Mr. Weidman was graduated from Pennsylvania State University and after 3 years as a patternmaker became sales representative for foundries producing high-alloy products.

♦ ♦ ♦

E. C. Rook has been appointed vice president-general manager of Blaw-Knox Equipment Division's plants in Blawnox, Pa., and Elyria, O., succeeding **G. L. Dirks,** resigned. Mr. Rook, who recently retired as a captain in the U. S. Navy, received a master's degree in metallurgical engineering at Carnegie Institute of Technology in addition to his studies at the Naval Academy and Naval War College. Recently he managed the Naval Ammunition Depot, Crane, Ind.

♦ ♦ ♦

D. R. Lurie, Barrett Division, Allied Chemical & Dye Corp., is now district sales manager, industrial resins, for the southeastern United States. His headquarters are in Greensboro, N. C.

♦ ♦ ♦

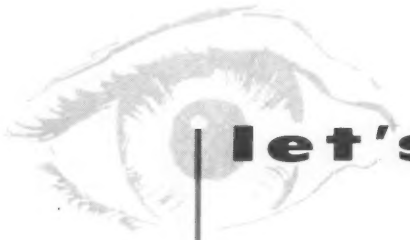
Arthur A. Batts Jr., for 7 years director of commercial research, Carborundum Co., Niagara Falls, N. Y., has been named director of market research, American Locomotive Co., Schenectady, N. Y.

♦ ♦ ♦

George Beach has been appointed assistant to the sales manager, Cleco Pneumatic Tool Co., division of Reed Roller Bit Co., Houston, Tex. Mr. Beach joined the company in 1947.

♦ ♦ ♦

Donald E. Matthieu, formerly chief metallurgist, Alabama Pipe Co., Anniston, Ala., was recently named district sales manager of Kerchner, Marshall & Co. at Richmond, Va.



let's look at

a molding machine which is inexpensive to install . . .

one which will be in operation within 24 hours after delivery . . .

a molding machine which is shipped completely assembled . . .

a versatile unit that is simple to operate.

All of these features apply to the HERMAN molding machine illustrated here. And there's a lot more to be said about it, too . . .

1. Every operation on the 1500 Pound Jolt Rollover Machine is controlled by a single valve.
2. Your operator never has to leave the control stand.
3. A timer controls jarring action so that it stops automatically as soon as proper density is reached.
4. No jerking, bucking, jumping or slamming in rollover and draw action. Hydraulic operation is slick, smooth and steady.
5. Perfect draws are assured by an automatic equalizer which adjusts itself to all irregularities.
6. Finished mold or core is deposited directly on the conveyor.

Hundreds of these **HERMAN** 1500 Pound Jolt Rollover Machines installed in foundries, here and abroad, are proof of their ability to do a job for you.

the HERMAN 1500 pound high-speed jolt rollover machine

Why don't you get in touch with us right now for more information. Write for our catalog No. GC-11-53.

HERMAN PNEUMATIC MACHINE CO., UNION BANK BUILDING, PITTSBURGH 22, PA.

HERMAN

Best Known Name in Molding Machines

C. L. Harrell presents report of the program appraisal committee

A. C. Mertz, right, receives plaque from A. J. McDonald, society head

E. M. Layman, General Steel Castings Corp., names safety winners

STEEL FOUNDERS' SOCIETY

Reviews Activities Program

By FRANK G. STEINEBACH
Editor

WHAT services should a trade association provide its members? Concerned with this question, the officers and directors of the Steel Founders' Society of America two years ago appointed a committee to survey the membership and evaluate the job being done. This committee sent an extensive questionnaire to the membership, interviewed many, and engaged a firm of management engineers to study the vast amount of material collected.

The report of the Program Appraisal Committee, a lengthy document studded with recommendations and suggestions, was presented at the 52nd fall meeting of the society at the Greenbrier, White Sulphur Springs, W. Va., Sept. 27-28. The presentation was made by C. L. Har-

(*Continued on page* 158)

WINNERS IN SFSA 1954 SAFETY CONTEST

PLAQUE AWARDS
(No Lost-Time Accidents)

Group No. 1, 1 to 20 Thousand Man-hours Exposure

ATLANTIC STEEL CASTINGS CO.
Chester, Pa.
DEEMER STEEL CASTING CO.
New Castle, Del.
MALLEABLE IRON FITTINGS CO.
Branford, Conn.
QUINCY STEEL CASTING CO. INC.
North Quincy, Mass.
EASTERN MALLEABLE IRON CO.
Wilmington, Del.
WORTHINGTON CORP.
Harrison, N. J.
TONAWANDA ELECTRIC STEEL CASTING CORP.
North Tonawanda, N. Y.
STANDARD BRAKE SHOE & FOUNDRY CO.
Pine Bluff, Ark.
BREWSTER CO. INC.
Shreveport, La.
CALDWELL FOUNDRY & MACHINE CO. INC.
Birmingham
DARBYSHIRE STEEL CO. INC.
El Paso, Tex.
McCONWAY & TORLEY CORP.
Pittsburgh
ALLOY CAST STEEL CO.
Marion, O.
ALLEGHENY LUDLUM STEEL CORP.
Ferndale, Mich.
CALUMET STEEL CASTINGS CORP.
Hammond, Ind.
STAINLESS FOUNDRY & ENGINEERING CO.
Milwaukee
LOCOMOTIVE FINISHED MATERIAL CO.
St. Joseph, Mo.
MISSOURI STEEL CASTINGS CO.
Joplin, Mo.
PACIFIC STEEL CASTING CO.
Berkeley, Calif.
SKAGIT STEEL & IRON WORKS
Sedro-Woolley, Wash.

Group No. 2, 21 to 35 Thousand Man-hours Exposure

CHAPMAN VALVE MFG. CO.
Indian Orchard, Mass.
STRONG STEEL FOUNDRY CO.
Buffalo
DIBERT, BANCROFT & ROSS CO. LTD.
New Orleans
FLORIDA MACHINE & FOUNDRY CO.
Jacksonville, Fla.
HUGHES TOOL CO.
Houston, Tex.
ROSS-MEEHAN FOUNDRIES
Chattanooga, Tenn.
TEXAS STEEL CO.
Fort Worth, Tex.
FEDERAL STEEL PRODUCTS CORP.
Houston, Tex.
AMERICAN CAST IRON PIPE CO.
Birmingham
UNITCAST CORP. (Plant No. 3)
Toledo, O.
LECTROMELT CASTING DIVISION, AKRON STANDARD MOLD CO.
Barberton, O.
AMERICAN HOIST & DERRICK CO.
St. Paul
ST. LOUIS STEEL CASTING CO.
St. Louis
ALLOY STEEL & METALS CO.
Los Angeles
NATIONAL SUPPLY CO.
Torrance, Calif.
WESTLECTRIC CASTINGS INC.
Los Angeles

Group No. 3, 36 to 70 Thousand Man-hours Exposure

TEXAS ELECTRIC STEEL CASTING CO.
Houston, Tex.
MACKINTOSH-HEMPHILL CO.
Midland, Pa.
MAYNARD ELECTRIC STEEL CASTING CO.
Milwaukee
MICHIGAN STEEL CASTING CO.
Detroit
NATIONAL MALLEABLE & STEEL CASTINGS CO.
Melrose Park, Ill.
WEHR STEEL CO.
Milwaukee
LOCOMOTIVE FINISHED MATERIAL CO.
Atchison, Kans.

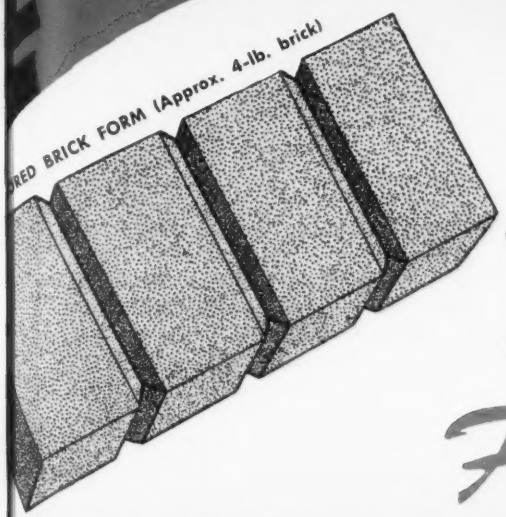
Group No. 4, 71 and up Thousand Man-hours Exposure

AMERICAN STEEL FOUNDRIES
Granite City, Ill.
OKLAHOMA STEEL CASTINGS CO. INC.
Tulsa, Okla.
PITTSBURGH STEEL FOUNDRY CORP.
Glassport, Pa.
CONTINENTAL FOUNDRY & MACHINE CO.
Coraopolis, Pa.

CERTIFICATE AWARDS
(Frequency Rate as Shown)

CONTINENTAL FOUNDRY & MACHINE CO. East Chicago, Ind.	(2.6)
SYMINGTON-GOULD CORP. Depew, N. Y.	(2.9)
CONTINENTAL FOUNDRY & MACHINE CO. Wheeling, W. Va.	(3.3)
OHIO STEEL FOUNDRY CO. Lima, O.	(3.4)
BIRDSBORO STEEL FOUNDRY & MACHINE CO. Birdsboro, Pa.	(3.4)
UNITED ENGINEERING & FOUNDRY CO. Vandergrift, Pa.	(3.4)
BUCKEYE STEEL CASTINGS CO. Columbus, O.	(3.6)
CRUCIBLE STEEL COMPANY OF AMERICA Harrison, N. J.	(3.9)
CANADIAN CAR & FOUNDRY CO. LTD. Montreal, Quebec, Canada	(5.2)
GENERAL STEEL CASTINGS CORP. Eddystone, Pa.	(5.3)
DAYTON STEEL FOUNDRY CO. Dayton, O.	(5.8)
RACINE STEEL CASTINGS CO. Racine, Wis.	(5.9)
GREDE FOUNDRIES INC. Milwaukee	(6.7)
NATIONAL MALLEABLE & STEEL CASTINGS CO. Cicero, Ill.	(7.0)
BURNSIDE STEEL FOUNDRY CO. Chicago	(8.3)
DURIRON CO., INC. Dayton, O.	(8.5)
DOMINION FOUNDRIES & STEEL LTD. Hamilton, Ontario, Canada	(9.0)
ALLIED STEEL CASTINGS CO. Harvey, Ill.	(9.3)
GENERAL METALS CORP. Oakland, Calif.	(9.9)

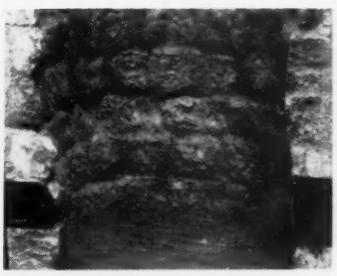
MORE PROFIT here



MINIMIZE CASTING SCRAP LOSS, TURN SAVINGS OF TIME, LABOR AND MATERIAL INTO PROFIT, BY USING—

Famous CORNELL CUPOLA FLUX

THE CUPOLA before using Famous Cornell Cupola Flux.



THE CUPOLA where famous Cornell Cupola Flux is used.

While preparing iron for better castings, Famous Cornell Cupola Flux keeps cupolas cleaner and thereby reduces digging out time to the minimum. It also forms a glazed or vitrified protective surface on brick or stone, reducing erosion of cupola lining—and repairs.

In many leading gray iron foundries and malleable foundries with cupolas, in fact wherever its achievements are known, Famous Cornell Cupola Flux is selected for the job of cleansing molten iron for better castings.

It not only does a thorough job of cleansing iron but desulphurizes it, makes it more fluid and keeps slag fluid. You get sounder, cleaner castings and improved machinability.

You cannot afford to be without it, it costs so little to buy and takes but a few seconds of labor to use, due to its exclusive premeasured SCORED BRICK FORM.

WRITE FOR BULLETIN NO. 46-B

The Cleveland Flux Co.

1026-1040 MAIN AVENUE, N. W., CLEVELAND 13, OHIO

Manufacturers of Iron, Semi-Steel, Malleable, Brass, Bronze, Aluminum and Ladle Fluxes – Since 1918

FAMOUS CORNELL FLUXES
Trade Mark Registered

BRASS FLUX

FAMOUS CORNELL BRASS FLUX cleanses molten brass eve when the dirtiest brass turnings or sweepings are used. Yo pour clean, strong castings which withstand high pressur tests and take a beautiful finish. The use of this flux save considerable tin and other metals, and keeps crucible and fur nace linings cleaner, adds to lining life and reduces maintenance

ALUMINUM FLUX

FAMOUS CORNELL ALUMINUM FLUX cleanses molten aluminur so that you pour clean, tough castings. No spongy or porou spots even when more scrap is used. Thinner yet stronger sec tions can be poured. Castings take a higher polish. Exclusiv formula reduces obnoxious gases, improves working condition: Dross contains no metal after this flux is used.

(*Continued from page* 156)

rell, president, Sterling Steel Casting Co., East St. Louis, Ill., and chairman of the committee. Other members of the committee are A. M. Andorn, chairman of the board and president, Penn Steel Castings Co., Chester, Pa., and Cleve H. Pomeroy, president, National Malleable & Steel Castings Co., Cleveland.

The report recommended some slight changes in emphasis of certain activities. In addition to those activities already functioning, the committee strongly recommended the start of a market research program by the society. The committee recommended that the research program should be extended, but on a definite five-year basis. It also recommended the establishment of a research foundation of the society.

In opening the meeting, A. J. McDonald, vice president, American Steel Foundries, Washington, and president of the society, outlined some of the recent changes which have been made by the organization. He stated that George K. Dreher had been elected secretary, that he will be secretary of all general committees except safety, and that he also will function in the field of public relations. James H. Lowe, who has been director of product development of the society, has been appointed assistant technical and research director.

William Callahan has completed his two years' service with the society in the technical and research department and has joined the Malleable Iron Fittings Co., Branford, Conn. Jerome M. Hathaway has joined the society in the training program, replacing Mr. Callahan.

A management letter, published quarterly, has been inaugurated. This will contain material of great interest to management and was highly recommended by the president. Mr. McDonald reported that a correspondence course embracing all phases of foundry work is being prepared by the American Society for Metals and that the Steel Founders' Society of America has accepted the task of preparing the fifteen lessons covering the steel foundry industry. Certain chapters will be written by men from industry and full credit for the production of this work will be given to the society.

The society also is inaugurating a research journal which will review research projects in the foundry field and will be published about every four months. This program is to spark greater interest in the application of research in the growth of the individual foundry organization. He indicated that the society now has 14 research projects under way and that the third research contract with the Army has been started.

Minimum Standard Adopted

Mr. McDonald indicated that one of the most important recent developments of the society is the adoption of a recommended minimum standard for commercial carbon steel castings. (FOUNDRY, October 1954, pp 103, 132, 133.) He paid high tribute to the results obtained in the safety program and announced that the National Safety Council is giving the society an award for an outstanding job in this field. The award will be accepted on Oct. 19 during the National Safety Council meeting at Chicago by E. M. Layman, director of personnel, General Steel Castings Corp., Granite City, Ill., and chairman of the society's Safety Committee.

In conclusion Mr. McDonald outlined some of the recent developments in Washington of interest to foundries. He stated that preparation of controls to be used in case of emergency is well under way and that these will cover prices, wages and rents. An order and regulations for blanketing each separate subject under control is being prepared as is an executive order to implement a freeze order which would follow action by the Congress. He emphasized that the industry should give more attention to providing personnel to staff the castings branch of the Iron and Steel Division, Business & Defense Services Administration.

(*Concluded on page* 160)

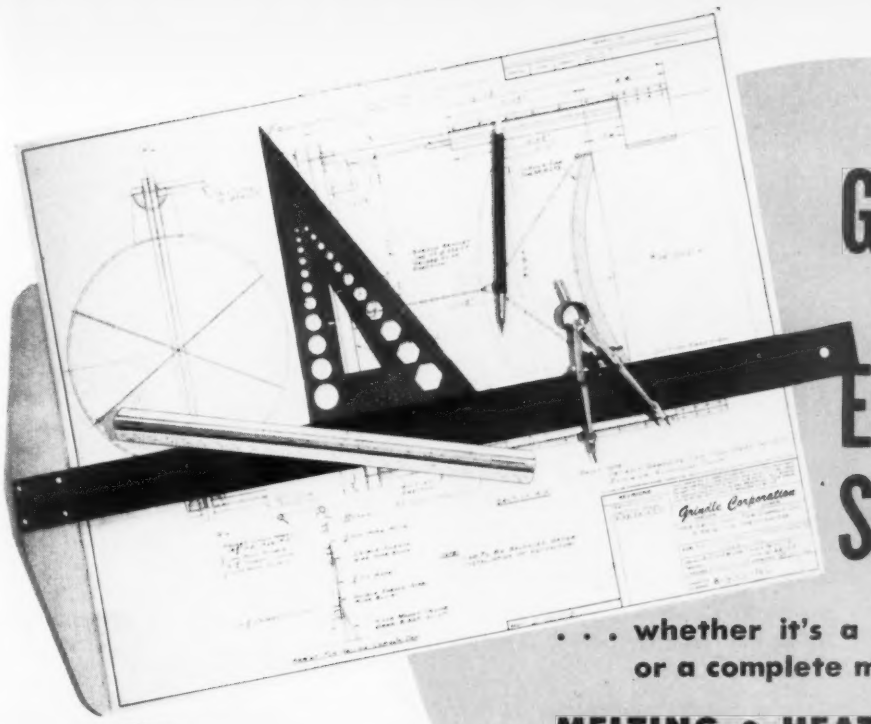
Alloy Casting Institute Publishes New Data

NEW data sheets describing the properties of all of the most popular grades of stainless steel alloys used in corrosion resistant castings have just been issued. The complete set of 13 individual data sheets is bound in an attractive file folder.

Alloy Casting Institute, the technical association of high-alloy foundries, has spent ten years compiling the data now available. Co-operating in the project were other groups, notably the American Society for Testing Materials and the Society of Automotive Engineers.

Each data sheet lists applications, chemical compositions, physical and mechanical properties, and includes a discussion of design consideration.

The complete set of data sheets is available from the Alloy Casting Institute, 32 Third Ave., Mineola, N. Y.



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Every *Grindle* installation must meet rigid Company standards of Quality, Performance, Economy . . . in initial cost and operation.

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Grindle installations are self-liquidating.

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(*Concluded from page* 158)

Everett Chapman, consulting engineer, West Chester, Pa., presented an interesting discussion of the importance of shape in structures, especially those fabricated by welding. He indicated that the salvation of the foundry business is in component structures which must have shape if they are to last. This certainly called for castings.

Dr. Martin Gainsbrugh, chief economist, National Industrial Conference Board, New York, presented an interesting appraisal of the business scene. He detailed the plus and minus factors in the economy, discussed the factors that brought about the present drop in business, and indicated that while there is nothing on the horizon to suggest a short time boom, recent trends should provide a moderate recovery for the closing months of the year. This will be superimposed upon a healthier long-term trend for the years ahead.

Earl M. Layman expressed great appreciation for the interest of a large portion of the society in the safety program. As a result of the efforts of many companies, the frequency rate of the steel casting industry has gone down, and still is dropping. He then announced the winners of the recent three-month safety contest and awarded the plaques to the representatives of the winning companies. The list of winners is presented on page 156.

Society President McDonald presiding at fall meeting opening session

At the banquet, L. C. Mertz, vice president in charge of sales, Unitcast Corp., Toledo, was awarded a plaque by the society in appreciation of his service to the industry during the Korean emergency as consultant to the Metals Division, Office of Price Stabilization.

Malleable Foundry Sees Century of Service

One hundred years of malleable iron founding are described in a booklet, "Fitting Reflections," published by Malleable Iron Fittings Co., Branford, Conn. The history of the region and the character of the men who lived there have found expression in the 100 years of service that have passed since Oct. 2, 1854, when the company was formed. Much early history is included in the booklet.

HOW TO DO IT

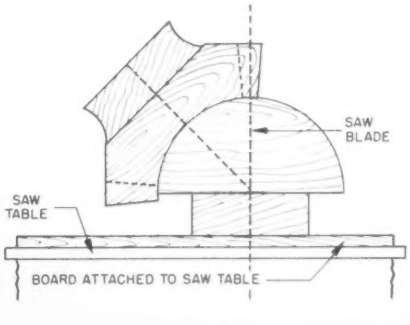
Band Saw Is Used To Cut Teeth On Wooden Bevel Gear Pattern

By DEWAR FORBES
West Linn, Oreg.

TEETH on a bevel gear pattern may be cut accurately on a band saw machine with a fine-toothed blade. The method utilizes the geometric principle that all basic lines in a bevel gear converge on a common vertex.

The gear blank pattern is turned on a lathe with a socket having a radius scribed from the vertex. A partial sphere then is made with the same radius and mounted on a flat board. By having the same radius the socket in the gear blank will fit exactly the sphere in the manner of a ball and socket.

The sphere and board assembly is cut through to the center on the band saw and clamped to the saw table. After the cross-sectional outline of the teeth is laid out on the gear blank it is ready to be placed on the sphere and sawed. If the gear pattern is kept carefully on the sphere during sawing, the face width and clearance angles of teeth will be radially accurate.



Easy Way to Keep Resin Bonded Core Sections Together

By KENNETH L. MOUNTAIN
Assistant Editor

Here is an idea for coremakers who have had trouble keeping resin bonded core sections together. Any standard shellac is diluted with alcohol to a watery consistency. As the mixture is brushed on areas of the core sections to be bonded, an immediate penetrating action is noticeable. The mixture on the section surfaces is ignited with a match or a cigarette lighter. The alcohol will burn itself out in a few seconds, leaving hardened surfaces to which core paste is applied. Core sections are placed upon these hardened surfaces, and after core paste has dried, it is virtually impossible to pull the sections apart in normal handling.

Do you have any tricks of the trade tucked away with your foundry experience? Why not release them to fellow foundrymen? FOUNDRY will pay a minimum of $15 for each idea submitted and published. Send a photo or drawing with your idea

Just mix with water and pour . . . the most convenient of all

High-Temperature Insulating Materials

For convenience, speed of installation, and minimum downtime you can't beat ALFRAX® castable aluminum oxide cements. To install, just mix them with water and pour—like regular Portland cement. They start to harden almost immediately after casting.

These ALFRAX castables, being made of aluminum oxide, are highly refractory. They will stand up under temperatures ranging from 2800 to 3100 F, depending on type—with practically no shrinkage. They are unaffected by furnace atmospheres and combustion gases. They have low heat capacity, and thereby permit faster heating of a furnace. Because the alumina in the cement is in the form of very small, hollow spheres which effectively block heat loss, ALFRAX castables are among the best insulating materials for very high temperature work.

ALFRAX castables make ideal back-up linings for nonferrous crucible furnaces, either pit type or tilter. They make suitable burner blocks for core ovens or malleable annealing furnaces. They can be used to back up sidewalls of reverberatory furnaces. In short, they can be used almost any place where the convenience of a castable is desired along with assurance of longest possible life.

Why not check up? We make lining materials to fit *every* need—rings, ring segments, and cements—and will gladly furnish recommendations to fit *your* needs. Address Dept A-114, Refractories Div., The Carborundum Co., Perth Amboy, N. J.

CARBORUNDUM

Registered Trade Mark

INDUSTRY BRIEFS

AMERICAN Hoist & Derrick Co., St. Paul 1, has entered the jobbing castings business. The company has enlarged its foundry capacity and now can offer individual castings up to 6 tons in steel and 10 tons in gray iron. J. D. Johnson is the sales head of the new division; he was formerly foundry research director for Archer-Daniels-Midland Co., Minneapolis. H. M. Patton, for the last 12 years foundry superintendent, will be in charge of custom casting production.

* * *

Frederic B. Stevens Inc., Detroit 16, has expanded two of its plants. The Springfield, O., plant has been expanded and special warehouse facilities have been added. Frederic B. Stevens of Canada Ltd. has completed a new foundry and metal finishing supply warehouse in Windsor, Ont.

* * *

City Pattern Foundry & Machine Co., Detroit, has added 2000 sq ft to its plant. This is the sixth enlargement since the company moved into the original quarters.

* * *

Northern Engineering Works, 210 Chene St., Detroit 7, has recently completed a buiding expansion program. The expansion includes a 20,000 sq ft assembly building, an addition to its existing structural fabricating area and complete new heating facilities. The company, manufacturer of electric traveling cranes, electric hoists and material handling equipment, has acquired additional property for parking and future expansion.

* * *

Republic Rubber Division, Lee Rubber & Tire Corp., Youngstown, O., has appointed the W. H. Summers Co., 400 Lakeside Ave. N. E., Cleveland, its distributor for Cleveland and northern Ohio. W. H. Summers Co. will carry a complete stock of hose, belting and packing.

* * *

Victors Brass Foundry Inc., Guilford, Conn., has been presented a safety plaque by Hardware Mutuals for an outstanding safety achievement.

* * *

Doehler-Jarvis Div., National Lead Co., New York, N. Y., has closed its Chicago plant at 2255 43rd St. Its production of alumium and zinc die castings will be shifted to division plants in Toledo, O., and Batavia, N. Y. The Chicago plant employed about 500 persons.

* * *

Wisconsin Stainless Foundry & Machine Corp., Waukesha, Wis., has been formed with an authorized capital stock of 5000 shares of common at par value of $10 per share. Incorporation papers were signed by B. Katz, M. M. Mitchell and G. S. Feinwell, all of Chicago. The registered agent is M. E. Nevins, 825 East St. Paul St., Waukesha, Wis.

* * *

Eastern Metal Products Corp., Tuckahoe 7, N. Y., will build a new small appliance manufacturing plant in Fort Smith, Ark. About 1200 persons will ultimately be employed in a 350,000-sq-ft plant. The first part of the plant, about 125,000 sq ft, is expected to be in production next March, the balance by the end of 1956. The plant will include permanent mold foundries and a die casting plant.

* * *

Alabama Pipe Co., Anniston, Ala., has established a $1000 scholarship fund at the University of Alabama for co-op students sponsored by the company. The sponsored students will enroll in the department of metallurgical engineering and will work alternate semesters with the company.

* * *

Mercast Corp., an affiliate of Atlas Corp., New York, plans to construct a new plant at La Verne, Calif., that is expected to be in full operation early in 1955. The Mercast process utilizes frozen mercury for the production of expendable patterns used in the manufacture of precision investment castings.

* * *

A-P Controls Corp., Milwaukee, has purchased the Milwaukee Valve Co. The valve plant will continue to manufacture its present line of brass and aluminum valves and will continue government work. Philip Fina will remain with the company as vice president.

* * *

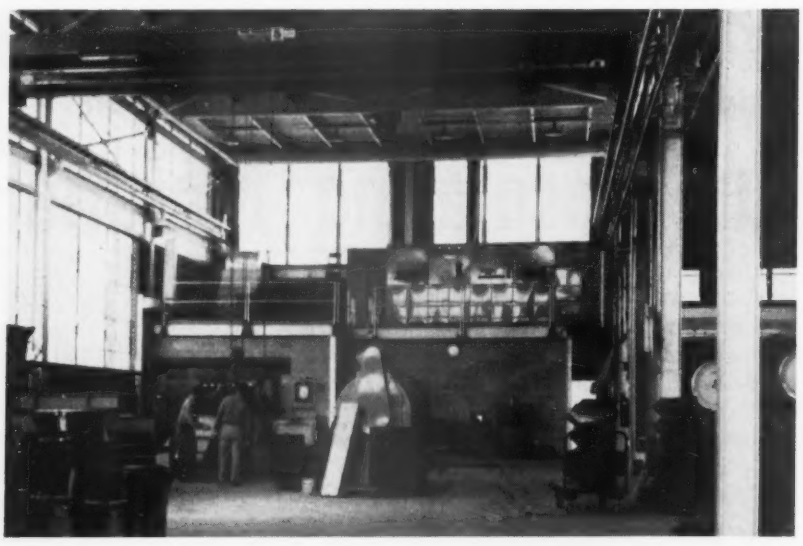
American Chain & Cable Co., Bridgeport, Conn., has purchased the Bristol Co., Waterbury, Conn., an industrial instrument manufacturer of automatic, mechanical and electrical controls. No changes are planned in Bristol's management or personnel.

* * *

A. Schrader's Son, Brooklyn 38, N. Y., has established new branch headquarters at 6464 Flotilla St., Los Angeles 22. The parent company manufactures air control equipment.

* * *

Lithium Corp. of America Inc., Rand Tower, Minneapolis 2, has opened a sales office at 540 Lincoln Bldg., 60 East 42nd St., New York 7. J. Douglas Campbell is in charge.



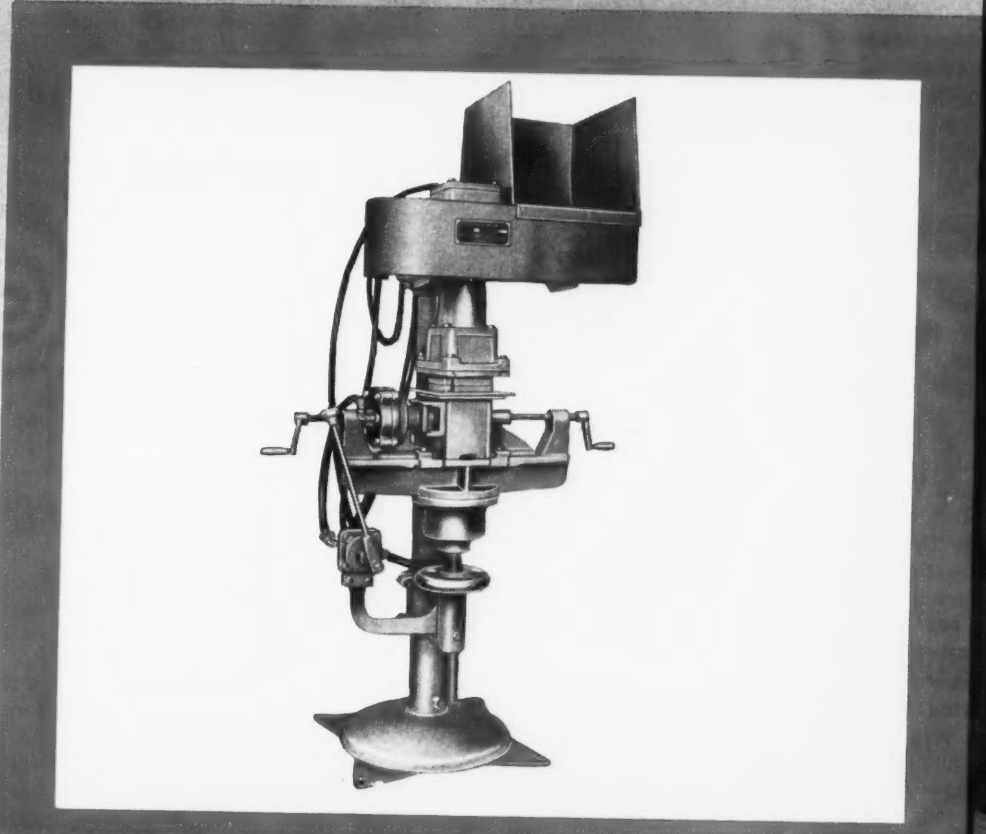
ALLOY PLANT: Austenal Laboratories Inc. has completed a 10,000-sq-ft addition to its 55,000-sq-ft Microcast works at Dover, N. J. Now in full operation, the plant includes casting and shotting facilities and fully equipped high-temperature testing and chemical laboratories. The firm plans to manufacture most of the alloys needed for its production needs

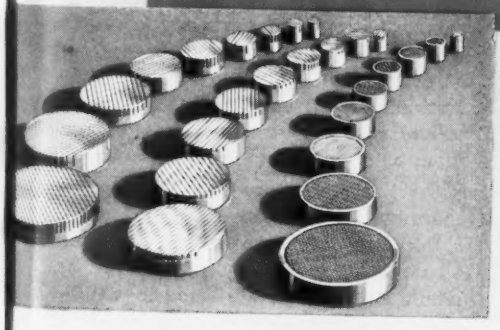
Our Sales Story is Simp

Demmler

Core Blowers hold the record for BOTH:

1. *Highest Production*
2. *Lowest Maintenance*

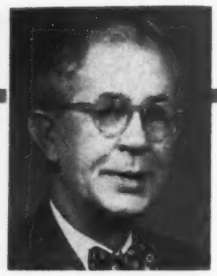




Demmler is the best source, too, for precision core box vents. Brass slotted, steel slotted and screen types for every application, including the new D-process.

When YOU buy a core blower, remember this: You cannot buy faster production, lower maintenance than Demmler's. The Demmler No. 55, shown above, is just one example. The "55" has one hand valve that operates both vertical and horizontal core box clamps and blows the core—all in 3 seconds! It's ideal for short-run jobs. And, just a glance shows the simplified construction that makes maintenance easy but seldom necessary. Demmler pioneered the design of core blowers, has led with examples like the "55" for the past 45 years!

Write for literat



MAN-TO-MAN

By RALPH L. LEE

The Manotometer

"We don't know anything yet about the untapped energy, resourcefulness, skills and productivity dormant in most of our people"

I DON'T know when I've got such a bang and a lift out of reading anything as I did from "Workers Don't Have To Be Robots" by Don Wharton, condensed from *The American Mercury* in the October issue of *Reader's Digest*. It related how Thomas J. Watson, chairman of the board, International Business Machines Corp., (one of our old National Cash Register boys) has reversed the trend toward simplifying jobs so that virtually no skill or brainwork is required and pay is the only reward left.

By turning operators loose, after careful preparation, to make their own setups, adjust their own machines and tools and inspect their own work, he has greatly reduced scrap, absenteeism, bellyaching and over-all costs. Simultaneously, production, suggestions and employee take-home pay definitely have been increased. Proving that this wasn't just an eccentric stunt by the fabulous Tom Watson, the idea has taken hold and spread to other organizations, with the same exciting results.

Right off the bat we've got to admit that manufacturing electronic brains, tabulating marvels, electric bookkeeping machines and typewriters is a far cry from making castings. On the other hand, we also have to admit that, as human beings, the folks who work for IBM have much in common with the folks who work for us.

I perked up when I read this article because I have plucked away on the same old string in our Man-to-Man column, to the tune of my belief that we don't know anything yet about the untapped energy, resourcefulness, skills and productivity dormant in most of our people, waiting to be sparked by the will to do.

I like to think that we've done some good with this harping, but now that I think of it in the light of this article, it might be that two things are standing in the way.

First from what I see and read, we may be becoming faddish in thinking that the only way to solve our problems and improve our operations lies in automation, mechanization, stop-watched and slide-ruled job disintegration and scientific quality control. These ingredients are to be masterminded into all-inclusive programs of equipment, procedures and systems. We've certainly got to admit, of course, that all this is to the good where there's room for it and it will fit.

The second hurdle is quite hush-hush, to be mentioned only behind closed doors and cupped hands in carefully selected company. It's the remnant of organized feuding which in the past erected artificial fences through our shops and foundries, separating those who operate from those who plan and guide the operations. And frequently the larger the foundries the higher the fences.

As we all know, this is a large subject, too large for treatment in this technical paper. But if this situation is a fact, then it might be considered slightly technical for this moment, at that. Here's what I'm driving at: Just a touch of class consciousness and set attitudes between these artificial groups could make us shy away from any mutually beneficial plan involving an approach to members of the other group for their help and co-operation.

Such a complex automatically would prevent any such item as the IBM stunt even from coming up for consideration. I think I can see how we might be driven under such conditions to go all-out on automation, mechanization and similar measures even when they are not called for.

Pride in privileges, struggles for new ones and face-saving in the event of the loss of the old have cost foundry and factory people one whale of a lot of money. But of far greater importance, it seems to me, and particularly to this brainstorm of mine, is this: The intensity of pride in work which offers the opportunity for taking it in personal accomplishment, individual responsibility, skills and ingenuity will pull rabbits out of hats as far as mutual benefit is concerned. Besides, provisions for this kind of pride will prevent those who have to have it from going outside to get it.

Please forgive the preachiness, but it just seems to me that—

Any assumption that most people or any sizable portion of the only people we can get are incapable of using their heads is DEAD WRONG—and costly.

Any assumption that they wouldn't use their heads if they could also is DEAD WRONG—and proof of ignorance.

In fact, *any* assumption that any group no matter how big or small, is this way or that way, is one way or another, also is DEAD WRONG. And in my opinion, such false assumptions lie at the bottom of most of the world's troubles today, both in shops and out.

Whenever we find ourselves with the habit of saying "THEY SAY, THEY ARE, THEY WILL, THEY WON'T, THEY CAN or THEY CAN'T," we may rest assured that we are well over on the ignorant side in this respect. You ask, "So what?"

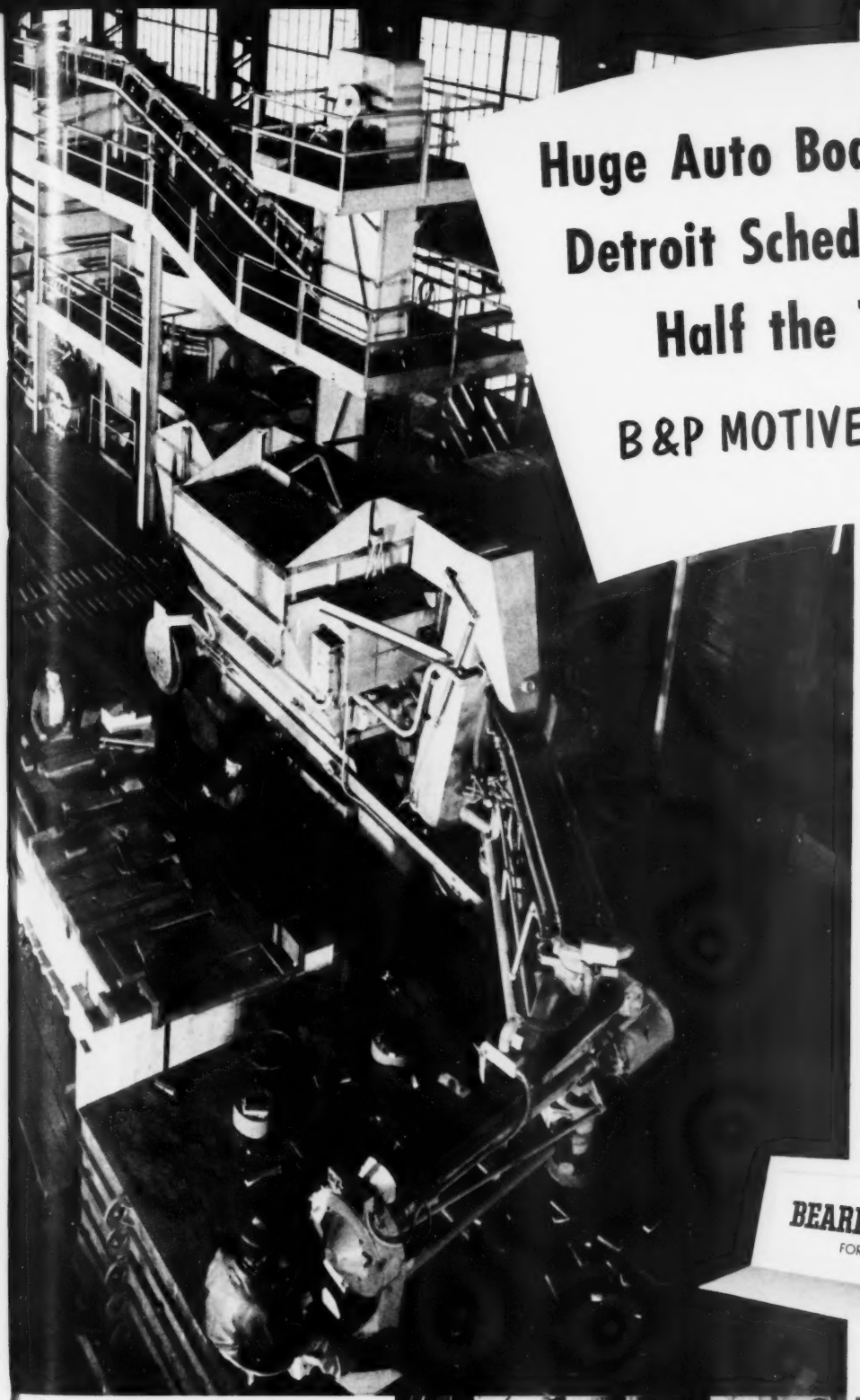
One horsepower-hour of work performed by human brawn costs $9 (one man at his best equals 1/6-hp but a motor can do the same work for not more than 7.4c (1/6-hp motor at 50 per cent efficiency; Lee Hobby Foundry pays 5c per kwhr). Facing this situation, we certainly are far from wise if we don't take advantage of every device automation, mechanization, electrification or otherwise provides to prevent men and women from being used for horsepower work.

On the other hand, it takes more than brawn to make castings. Many chinks are left between all that can be done by motor, cylinder, lever or chain for personal skill and ingenuity that can't even be predicted, let alone imitated, by iron and steel. (Thar's gold in them thar hills.)

It might not be a bad idea if we

(*Continued on page* 167)

Huge Auto Body Dies for Tight Detroit Schedules Rammed in Half the Time with a B&P MOTIVE SPEEDSLINGER

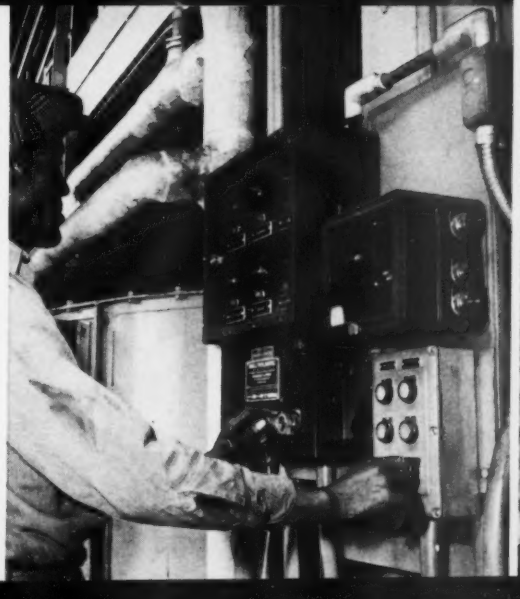


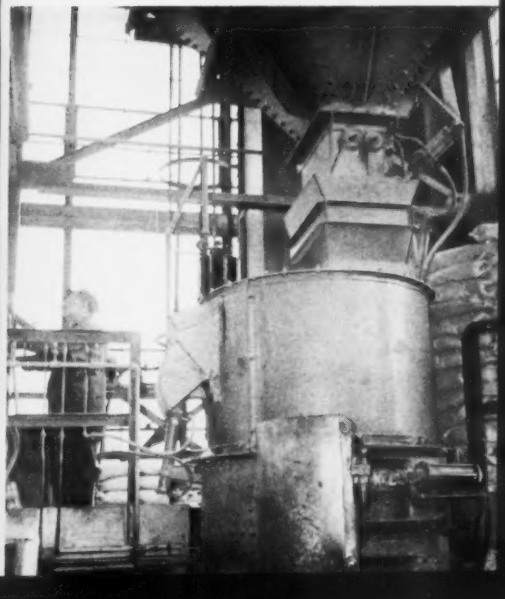
Pressed by customer demand for larger capacity and faster delivery, Central Iron Foundry, Detroit, outstanding producer of automotive body dies, again turned to Beardsley & Piper equipment. Central was one of the first users of B&P Sandslingers and Speedmullors, and knew the advantages of B&P's labor-saving foundry equipment. Of course, B&P had the answer: A Motive Speedslinger was coupled with a Model "80" Speedmullor and a B&P Stationary Preparator. The Preparator and the Speedmullor thoroughly condition and fully mull all of Central's molding sand for top capacity Speedslinger ramming. The entire molding sand unit and the Motive Speedslinger are shown on the left. Do you have a similar problem? *Write today to Beardsley & Piper, Div. Pettibone Mulliken Corp., 2424 N. Cicero Ave., Chicago 39.*

LOOK TO
BEARDSLEY & PIPER
FOR BETTER METHODS

MEMBER FEMA

Get the full story of Central Iron Foundry's operation. Ask for "The Shape of Things to Come", showing numerous photographs

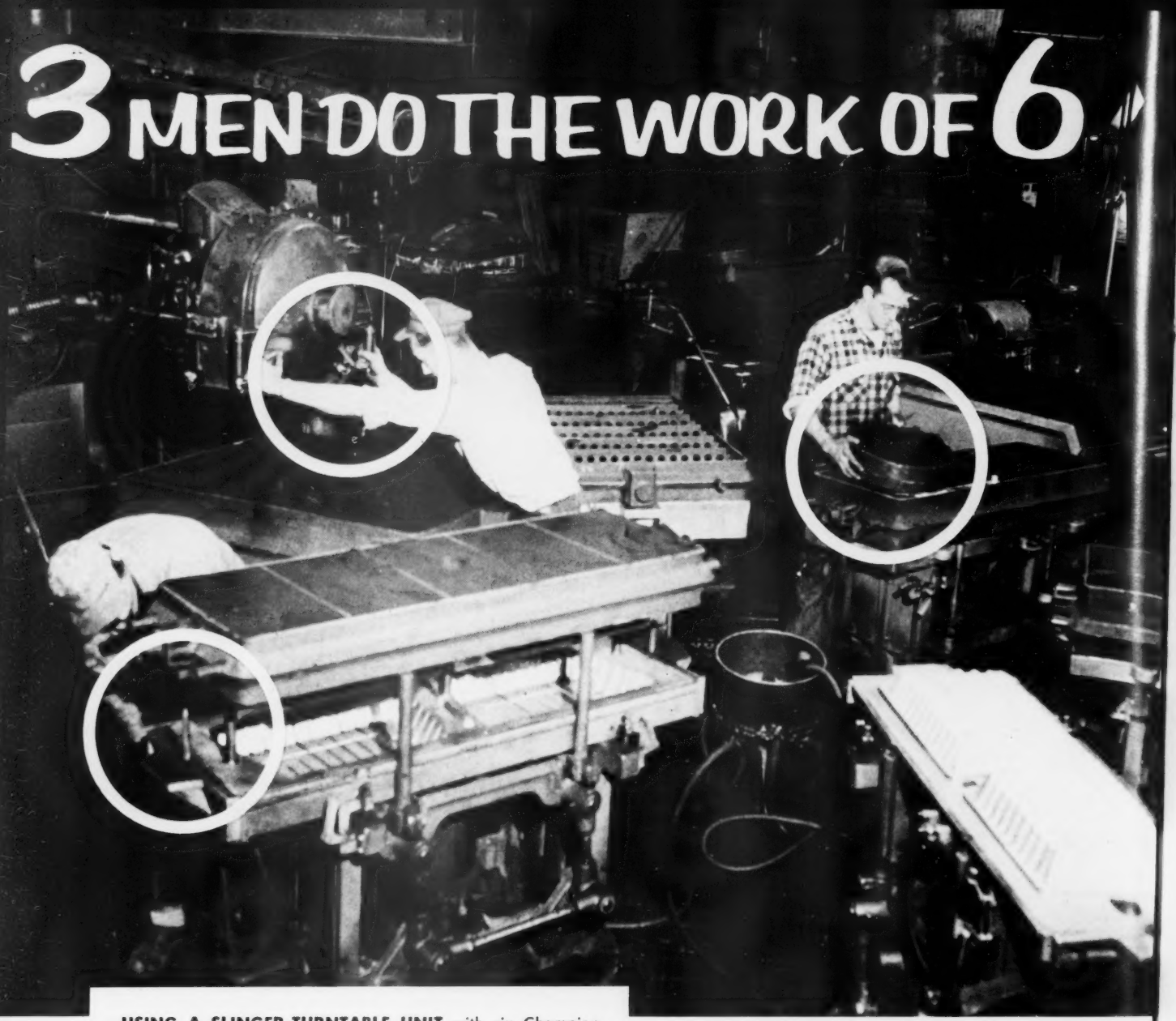




LEFT PHOTO Skiptrol and Mulltrolmatic control units. The Skiptrol controls the loading of the Skiphoist bucket. Mulltrolmatic times and controls all phases of the mulling cycle. The complete mulling cycle requires only 1½ minutes.

RIGHT PHOTO A B&P Model "50" Speedmullor mulls all of Central's core sand. For this exacting work sand mixtures must be perfect, and top capacity is essential.

3 MEN DO THE WORK OF 6



USING A SLINGER-TURNTABLE UNIT with six Champion Speed-Draw Machines three men ram 160 large molds on each shift at the Bennett-Ireland foundry at Norwich, N.Y. Cope and drag patterns for three different jobs are run at one time and jobs may be changed in a few moments without interrupting production.

Six Champion Speed-Draw Machines on a 16-foot turntable—the equivalent of six cope and drag molding stations—are served by a single Stationary Sandslinger supplied with Speedmullor mulled molding sand by a B&P Rotofeed. The equipment is highly flexible . . . three different jobs are run at one time . . . patterns may be changed without interrupting production . . . and the unit may be operated at capacity or at part-capacity with equally high man-hour efficiency. If you operate a jobbing foundry, information on these units will help you. Write to *Beardsley & Piper, Div. Pettibone Mulliken Corp., 2424 N. Cicero Ave., Chicago 39.*

AN '80' SPEEDMULLOR thoroughly mulls all of the molding sand for Bennett-Ireland's molding operations including that for the Stationary Sandslinger. Return sand is delivered to the mullor hot and is thoroughly cooled during the 1½ minute total mulling and cooling cycle. Another Speedmullor —a '40'—thoroughly mulls all of the foundry's core sand.

LOOK TO
BEARDSLEY & PIPER
FOR BETTER METHODS
B&P
MEMBER FEMA

(*Continued from page* 164)
rigged up sort of a Monotometer (it's an instrument like an optical pyrometer, although it hasn't been invented yet; I'll probably be working on it later). When focused on each job in the plant this instrument will indicate, right down to the second decimal point, the relationship between the interest and monotony content of each job. It will be center zero with opportunities for absorbing interest and personal skill on the right and insufferable monotony on the left.

After every job in the plant has been measured, each will be examined under the microscope to determine how much of the monotony is unavoidable, how much is due to the assumption that people can not or will not use their heads and how much is a by-product of blindly following the ritual of some theoretical system.

As a means of periodically checking the Monotometer (by the way, it's pronounced with the accent on *tom*, short *O's* and a long *e* in the next to the last syllable) on a particularly nasty or confusing job, we'll work on that job ourselves for at least one shift.

With the returns all in and carefully analyzed, I'll just betcha we'll be in a mood to pry many jobs apart and tuck in some opportunities for personal responsibility and pride of accomplishment. There should be sizeable benefits to all concerned as well as creation of a little more faith in the human race. And, who knows, we might even be tempted to take a flier (on a small scale of course) with Tom Watson's innovation. Holy smoke I didn't realize how late it is! I've got to get up there in the Lee Hobby Foundry and put in some of that $9-per-hour sweat.

Revised Cupola Handbook Published by AFS

Newly revised, the second edition of *The Cupola and Its Operation* represents the combined thinking of authorities on cupola operation. The 332-page technical book is the work of the Cupola Research Committee, American Foundrymen's Society.

New and enlarged sections cover hot blast, basic lining for nodular iron, emission control, refractories, principles of combustion and metallurgy. The new edition contains over 300 illustrations, 54 tables and a bibliography. Price of the book is $6 to AFS members, $9.50 to nonmembers.

Society Prints Directory

Annual directory of members of the Gray Iron Founders' Society recently has been published. It contains an alphabetical and geographical list of member companies with data on types of castings produced, monthly maximum commercial demand, classification and type of foundries, use made of castings produced, and listing of other facilities. A listing of member company executive personnel also is included.

Copies of the directory are available at $10 per copy at the society's headquarters, National City — East Sixth Bldg., Cleveland 14.

Lebanon Steel Foundry Gives Scholarship

Co-operation between industry and education was shown in a recent announcement that Lebanon Steel Foundry Foundation has established a scholarship fund at Lebanon Valley College, Lebanon, Pa. A joint announcement of the scholarship fund was made by Dr. William H. Worrilow, president of Lebanon Steel Foundry and a trustee of the college, and Dr. Frederic K. Miller, president of Lebanon Valley.

Meetings of Interest to Foundrymen

Nov. 1-5—American Society for Metals, National Metal Congress and Exposition, International Amphitheater, Chicago

Nov. 3-4—Investment Casting Institute, fall meeting, Congress Hotel, Chicago

Nov. 3-5—Steel Founders' Society, annual technical and operating conference, Carter Hotel, Cleveland

Nov. 10-12—Industrial Management Society, 18th annual time and motion study and management clinic, Sherman Hotel, Chicago

Nov. 11-12—Gray Iron Founders' Society, annual meeting, The Homestead, Hot Springs, Va.

Nov. 15-17—Magnesium Association, 10th annual meeting, Hotel Chase, St. Louis

Nov. 28-Dec. 3—American Society of Mechanical Engineers, annual meeting, Hotel Statler, New York

Dec. 1-4—American Institute of Mining & Metallurgical Engineers, electric furnace steel conference, Hotel William Penn, Pittsburgh

Dec. 2-7—American Society of Mechanical Engineers, 21st national exposition of power and mechanical engineering, Commercial Museum, Philadelphia

1955

Jan. 21—Malleable Founders' Society, general meeting, Hotel Cleveland, Cleveland

Jan. 24-27—Plant Maintenance & Engineering Show, International Amphitheater, Chicago. The **Plant Maintenance & Engineering Conference** will be held concurrently, also in the International Amphitheater

Feb. 10-11—Wisconsin Regional Foundry Conference, Schroeder Hotel, Milwaukee

Feb. 14-17—Industrial Ventilation Conference, Michigan State College, East Lansing, Mich.

Feb. 14-18—American Institute of Mining and Metallurgical Engineers, annual meeting, Conrad Hilton Hotel, Chicago

Feb. 17-18—Southeastern Regional Foundry Conference, Tutwiler Hotel, Birmingham

Mar. 9-10—Foundry Educational Foundation, college-industry conference, Hotel Cleveland, Cleveland

Mar. 14-15—Steel Founders' Society, annual meeting, Drake Hotel, Chicago

Mar. 26-27—California Regional Foundry Conference, Ambassador Hotel, Los Angeles

Mar. 28-Apr. 1—American Society for Metals, ninth Western Metal Congress and Western Metal Exposition, Pan-Pacific Auditorium, Los Angeles

Apr. 7-8—Malleable Founders' Society, market development conference, Edgewater Beach Hotel, Chicago

May 16-20—Sixth National Materials Handling Exposition, International Amphitheater, Chicago

May 23-27—American Foundrymen's Society, 59th annual convention, Houston, Tex.

June 16-18—Malleable Founders' Society, annual meeting, The Greenbrier, White Sulphur Springs, W. Va.

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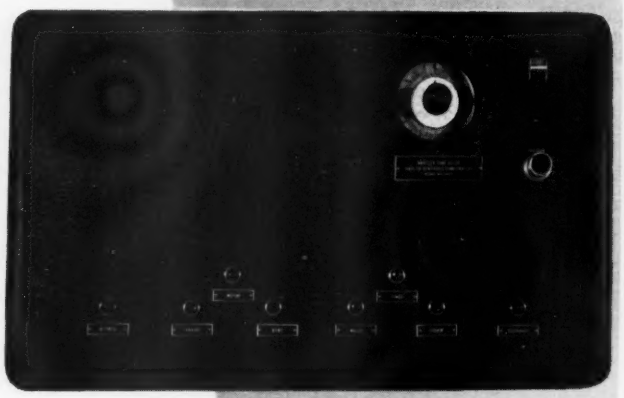
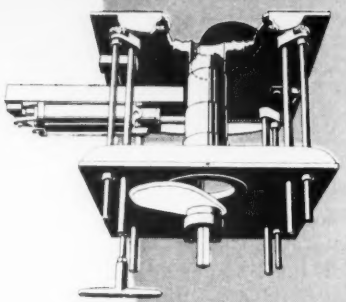
AUTOMATICALLY CONTROLS MOISTURE

SAND CONTROLS WILL REDUCE SCRAP



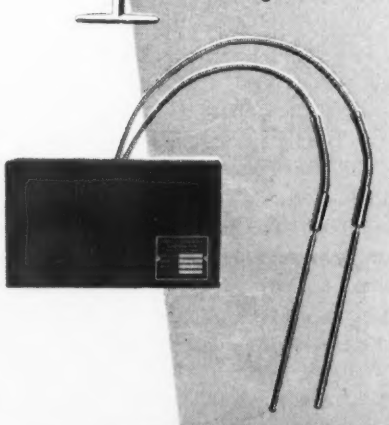
HARTLEY TIME-GUIDE
AUTOMATICALLY CONTROLS EVERY PHASE OF MIXING CYCLE

SAND CONTROLS INCREASE SAND PRODUCTION



BOND GUIDE
MEASURES AND CHARGES EXACT AMOUNT OF BOND AUTOMATICALLY

SAND CONTROLS PAY FOR THEMSELVES

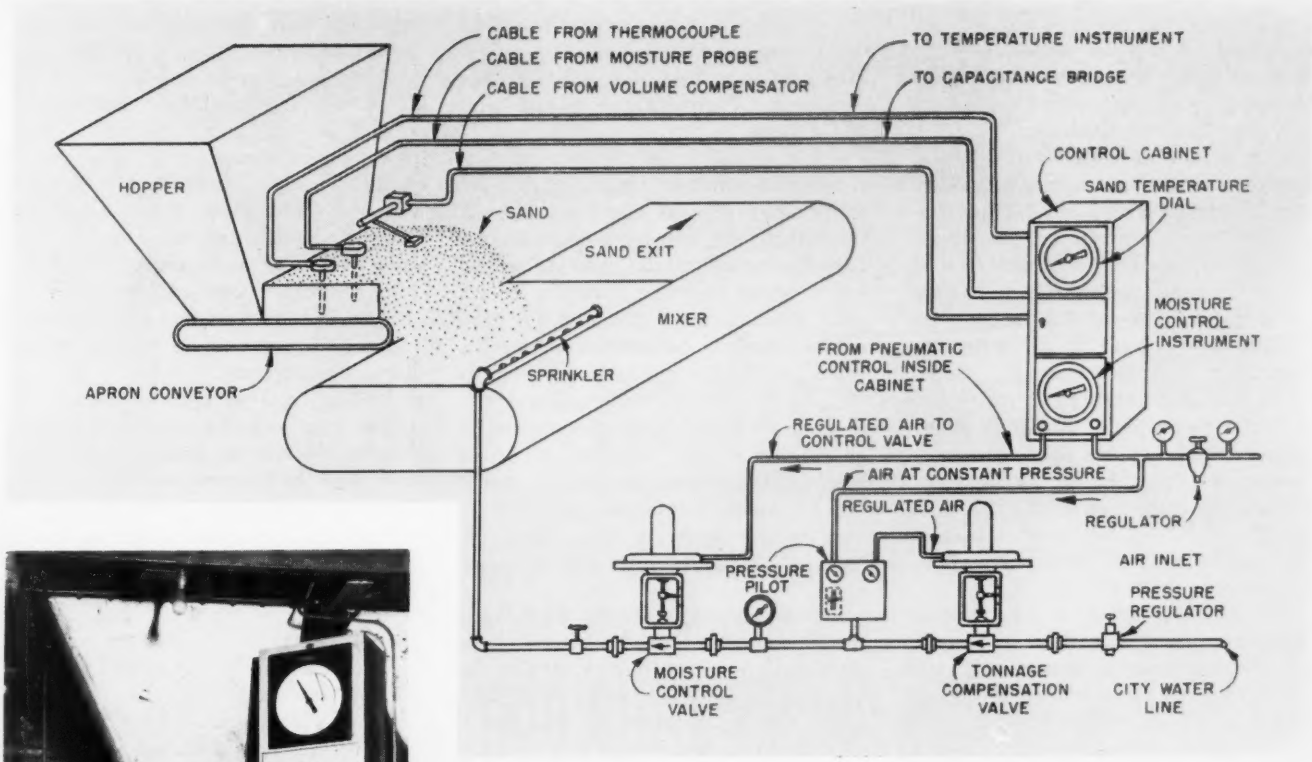


SAND LEVEL CONTROL
ASSURES THE MOLDER A CONSTANT SAND SUPPLY IN THE HOPPER

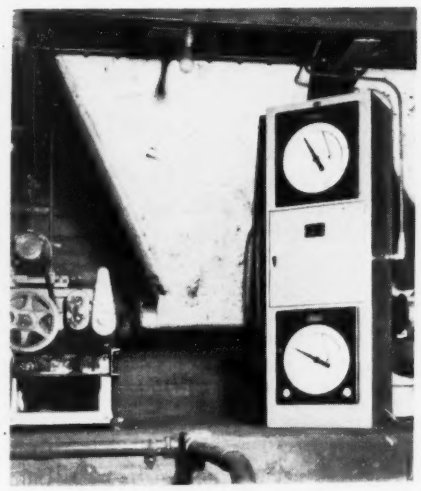
Each unit of control equipment illustrated will improve some phase of your sand system at a substantial savings in cost. You cannot afford to be without them! They are being used in many different types of foundries throughout the country and are available separately or as a group. When used together your entire system will be . . . . .

100% AUTOMATIC!

HAYLCO CONTROLS *Corporation*
NEENAH, WISCONSIN
(The ORIGINAL manufacturer of automatic controls for sand systems)



Schematic diagram of the automatic molding sand moisture control system



Heart of the system is this cabinet, housing indicating and control units

TEMPERS SAND AUTOMATICALLY

in a Continuous Mixer

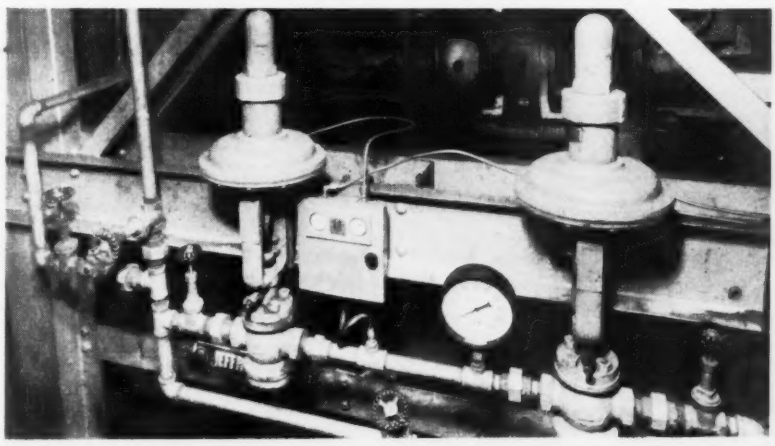
By ROBERT H. HERRMANN
Associate Editor

NEW equipment for accurate control of moisture in molding sand recently was installed at the Studebaker-Packard Corp., Detroit, foundry before its close-down for model changeover. The control unit is set up for one of Packard's mixers which prepares sand at the rate of 30 to 50 tons per hour for two molding lines. These lines make molds for cylinder blocks and transmission and manifold castings.

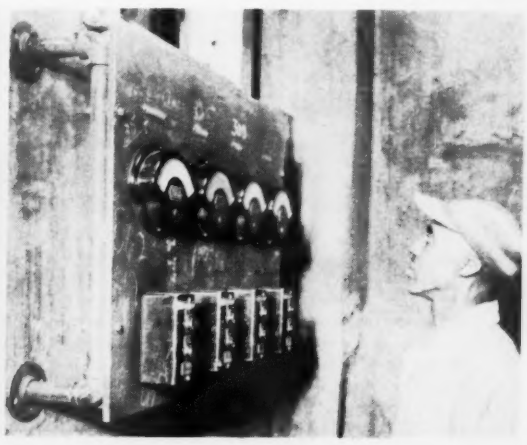
Moisture content of the sand is held within ±0.15 per cent. This close control is all the more significant because the mixer is a screw-type continuous unit.

Heart of the system is a sand tempering unit made by Harry W. Dietert Co., Detroit. It adds sufficient water to the sand to give a predetermined moisture percentage at the molding stations. To do that, mois-

Water flow is governed by these diaphragm motor valves



Pushbutton panel controls bond material additions



ture in the return sand is measured to determine the required base water. Additional water is added on the basis of sand temperature to allow for evaporation between the control unit and molding stations.

This is how it works: At the discharge end of an apron conveyor which carries return sand from the 40-ton storage hopper to the mixer are three measuring devices. One is a capacitance probe which senses moisture content of the sand. Its findings are relayed to an indicator-controller. A thermocouple transmits sand temperature to a second indicator-controller. Retained moisture content of the sand in this system varies from 0.3 to 2.0 per cent and in rare extremes to the full final temper of 3.7-3.9 per cent. Heat of the sand may vary from room temperature to 230° F.

The third device is a sand volume indicator. It consists of a pivoted lever which rides on top of the sand carried by the apron conveyor. Usually the height of the sand is constant, having been shaved off by the edge of the hopper discharge opening as the conveyor passes under it. Sometimes, however, excessively wet sand which sticks to the hopper sides caves in and shaves off the edges of sand on the conveyor, spoiling the rectangular pattern and, consequently, the precalculated volume. The findings of this device are relayed to a third controller.

Each one of these variables affects the amount of water required by the sand. The tempering unit automatically co-ordinates the demands from each and computes the exact flow of water that will produce the desired moisture content in the tempered sand.

Water from a city line is passed through diaphragm motor valves to a sprinkler pipe at the head end of the mixer. Incoming water first goes through a diaphragm regulator which holds water pressure constant to 20 psi. Then it flows through the first valve, which is adjustable through a hand operated pneumatic control, to pass water at a given pressure for a given tonnage of sand conveyed to the mixer. This pressure is 6 psi for sand at 40 tons per hour. Since the Packard installation operates at this volume most of the time, few changes in valve setting are necessary.

Operation of the second diaphragm motor valve is automatic through a pneumatic control device located in the Dietert sand tempering unit. This unit receives air at 17 psi through a pressure regulator from the foundry compressed air line. As more or less water is needed, based on the co-ordinated demands from the sand moisture, temperature and volume determinators, the pneumatic control enlarges or restricts the water valve opening by governing the pressure of air which is going to the valve diaphragm.

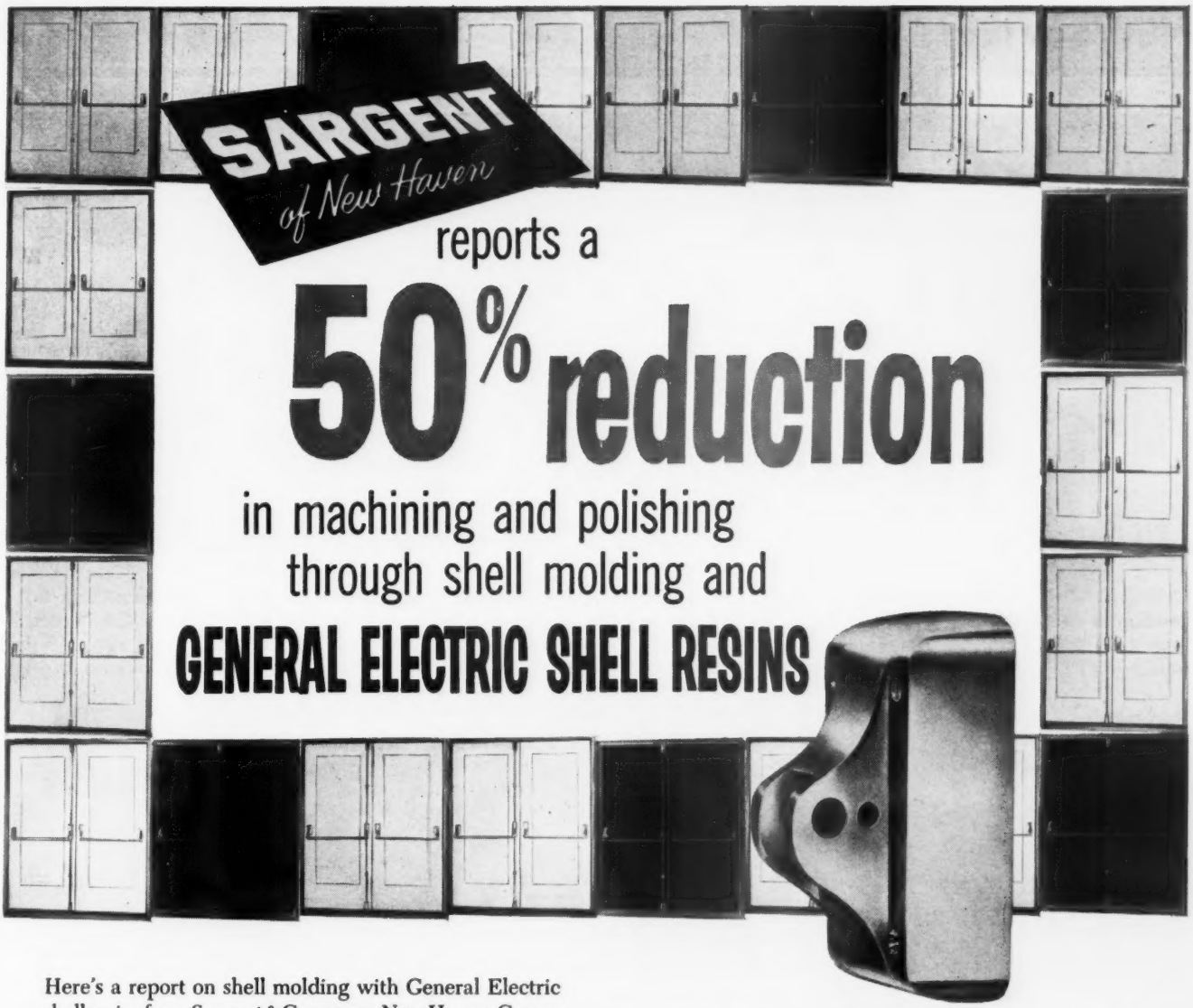
Bond additions are added continuously and automatically, additions being controlled through pushbuttons on a panel. Western bentonite, southern bentonite and sea coal are stored in three 1-ton capacity hoppers. Each hopper feeds into separate 4-in. diam enclosed screw conveyors. They feed a central 6-in. diam screw conveyor which empties into the sand mixer. Gages on the control panel show the number of pounds of material being moved by each conveyor each hour. Pushbuttons marked "fast" and "slow" govern the rate of material flow through variable speed electric motors which drive the screws.

Mulled sand is emptied from the mixer into a bucket elevator and is discharged into an aerator. A 24-in. overhead belt conveyor takes sand from the aerator to molding machine hoppers. Sand samples are taken at the molding machines at least once an hour. Sand specifications are: 3.7-3.9 per cent moisture, 90-100 permeability, 11.5-12.5 psi green compression strength and 90-120 psi dry compression strength.

This is a synthetic sand mix containing 7-8 per cent clay and 4.5-5.5 per cent carbonaceous material. It is a four-screen sand, AFS fineness number 55-60 and is composed of approximately two-thirds sharp lake sand and one-third bank sand.

According to Packard's foundry manager, the fixed level of moisture content in the molding sand improves molding conditions with a corresponding increase in production efficiency and reduction in scrap molds and scrap castings.

GM IS HOST TO MALLEABLE FOUNDERS: Members of the board of directors of the Malleable Founders' Society met Sept. 16 at Central Foundry Division, General Motors Corp., Saginaw, Mich., as guests of General Manager James H. Smith. After a meeting and lunch, they toured the division's malleable iron plant. From left to right, standing, are James H. Lansing, MFS, Cleveland; Charles Speitel, Pennsylvania Malleable Iron Corp., Lancaster, Pa.; Wilson H. Moriarty, National Malleable & Steel Castings Co., Cleveland; Lowell D. Ryan, MFS; George T. Boli, Northern Malleable Iron Co., St. Paul; James H. Smith; and C. L. Liebau, Federal Malleable Co., West Allis, Wis., vice president, MFS. From left to right, seated, are Leon J. Wise, Chicago Malleable Casting Co., Chicago; Phillip C. DeBruyne, Moline Malleable Iron Co., St. Charles, Ill.; Charles E. Brust, Eastern Malleable Iron Co., Naugatuck, Conn., president, MFS; Charles M. Brennan Jr., New Haven Malleable Iron Co., New Haven, Conn.; and R. L. Gilmore, Superior Steel & Malleable Casting Co., Benton Harbor, Mich.



reports a

50% reduction

in machining and polishing
through shell molding and

GENERAL ELECTRIC SHELL RESINS

Here's a report on shell molding with General Electric shell resins from Sargent & Company, New Haven, Conn.:

"Shell molding with G-E shell resins has proved ideal for producing parts for our new line of 'Quick' Exit Devices. The shell process permits the use of hard, high-grade bronze—resulting in a completed product unsurpassed in finish and texture."

Machining, polishing operations cut in half! "Parts are *sounder*—have more uniform grain structure. They're *smoother*—free from surface gas holes. *Machining and polishing operations were reduced by 50%*. Over-all result: a product better in both strength and appearance, produced more quickly and easily, with faster deliveries so important to sales."

Sargent uses three General Electric shell-molding products to turn out "Quick" Exit Device parts: **G-E 12374 phenolic shell-molding resin** to form light, dimensionally accurate molds, **G-E SM-55 silicone parting agent** to secure quick, easy release of molds from patterns, and **G-E 12316 bonding resin** to cement shell halves together.

FREE BOOKLET AVAILABLE

How can shell molding help YOU? General Electric, a major supplier of molding and release agents for the shell process, has prepared an informative 28-page manual telling about the techniques and benefits of this new foundry method. *Just mail the coupon for a free copy!*

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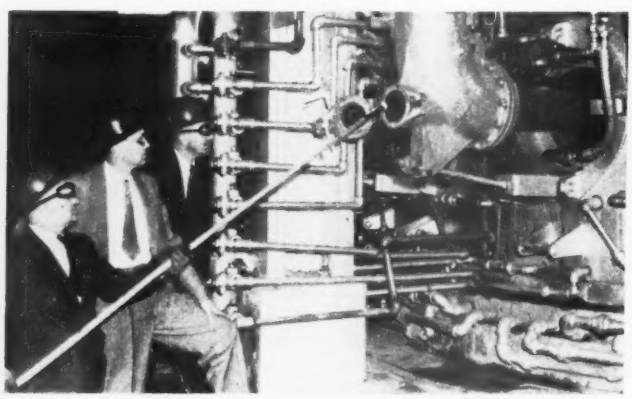
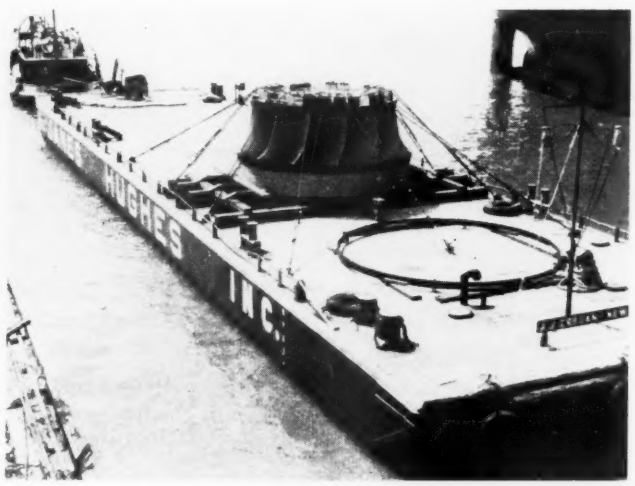
NEWS VIEWS

OPENING THE DOOR: Eight Wisconsin malleable iron companies sponsored a booth at the Wisconsin State Fair recently emphasizing the opportunities for youth in the foundry industry. Participating companies were Milwaukee Malleable & Gray Iron Co., Belle City Malleable Iron Co., Badger Malleable & Mfg. Co., Kirsh Foundry Co., Federal Malleable Co., Lakeside Malleable Castings Co., Chain Belt Co., and International Harvester's Waukesha Works



UNDER FIRE: Blast furnace "A" of U.S. Steel's American Steel & Wire Division, Cleveland, is seen being ignited by J. Allen, general superintendent. B. S. Klimsyzk (center), and H. Jenter, district manager, watch as the lighted flare is thrust into the furnace. Furnace is 229 ft high and is supplied 1000° F hot air blast from two 114-ft-high cylindrical heating stoves located adjacent to the furnace. Unit will supply merchant pig iron



GIANT TURBINE RUNNER: First of three giant hydraulic turbine runners for the Garrison hydroelectric plant near Riverdale, N. Dak., is shown being prepared for shipment by water from Baldwin-Lima-Hamilton Corp., Philadelphia, to Superior, Wis. Weighing 173,000 lb, the Francis type runner is said to be the largest ever cast in one piece. It measures 18½ ft at its diameter and is 9 ft high. Reported maximum horsepower rating is 134,000

DEDICATION: About 2000 persons attended the recent dedication of the new Buckeye Tools Corp. plant, Dayton, O. Company has been a manufacturer of air-powered rotary tools since 1920. Plant is a modern, single story structure providing 25,000 sq ft of office and manufacturing space. Company officials are depicted cutting the ribbon with one of their standard model shears, specially gold plated for the ceremony. Left to right, Earl Hamilton, secretary, A. G. Lauzon, president, Hal Gummere, vice president-general manager, and E. E. Reeves, treasurer

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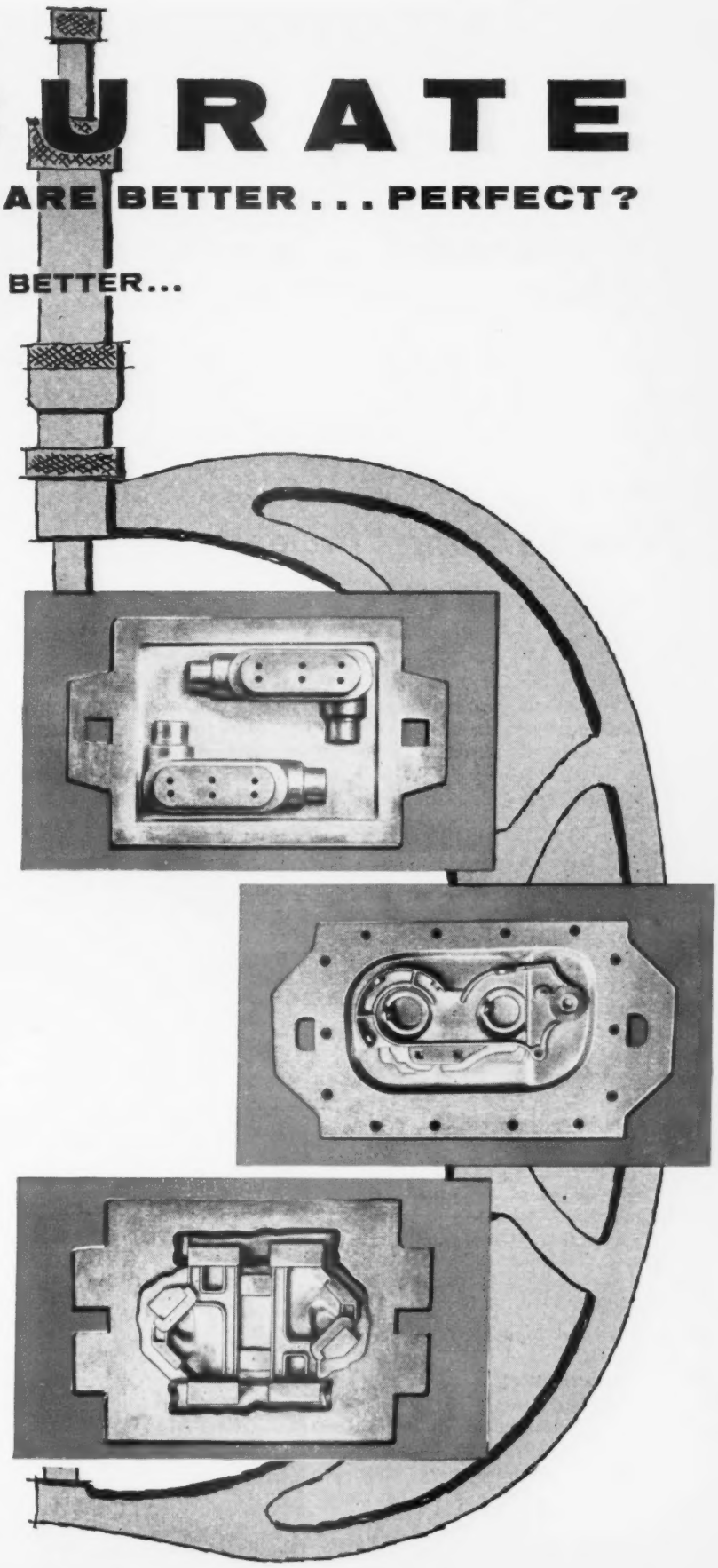

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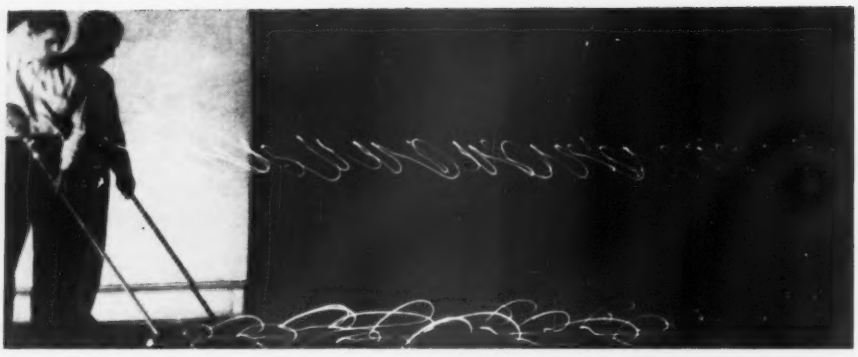


Lights mounted on top and bottom of a pushbroom show graphically number of motions which are required to sweep a comparatively small area

FLOOR CLEANING Can Be Done Efficiently

By FULLER ROSS

DUST and debris of many types and consistencies present major operational problems in metalworking shops. Dust is harmful to the working parts of costly machinery; it causes premature obsolescence of motors; it creates a fire hazard and adversely affects the health of workers. Debris clutters aisles and work space, slowing down work, causing accidents and fires.

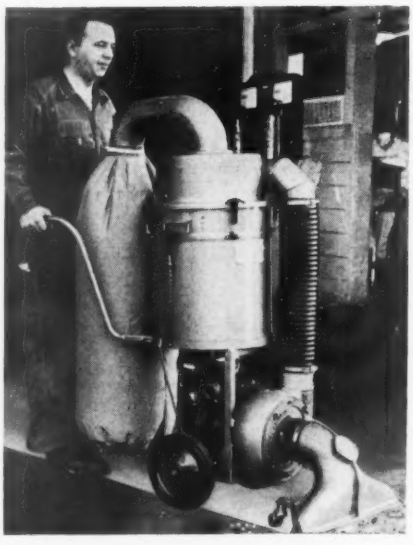
The cost of keeping floors clean has increased in recent years with the steady rise in cost of common labor to push the brooms that merely stir up the dust. Floor cleaning studies have shown that mechanical sweeper or vacuum floor cleaning reduces such cost by as much as 80 per cent, cuts cleaning time and also keeps the floors and platforms cleaner. Cleaning speeds of various types of equipment in square feet per hour follow:

Hand vacuuming (floor wand and hose)	1500
Hand sweeping (push broom and shovel)	3000
Floor type mechanical vacuuming	20,000
Motorless mechanical sweeping	15,000-22,000
Power-driven mechanical sweeping	25,000-100,000

Powerful industrial vacuum cleaners are effective but slow for use on large floor areas. Mechanical floor sweepers are fast and efficient but not suitable for dust collection. To fill the need for high-speed, effective dust collection, a new machine has been developed with a large suction nozzle mounted in fixed position just above the floor surface.

Heavy-duty suction floor cleaners perform functions which go beyond the capacities of mechanical sweepers. The wide orifice of this cleaner (31.5 sq in.) keeps properties free of trash and dust on a 22-in. path at speeds up to 20,000 sq ft per hr, and pieces of scrap and litter will not clog the large orifice. The unit is made with either gasoline or electric power and is capable of moving air at 860 cfm.

Such units employ a direct-driven impeller turning at 3450 rpm, which draws in air at 860 cfm. The open stage impeller has a housing clearance, permitting passage of any material which can enter the 1¼ x 22-in. suction orifice. The unit weighs 120 lb and is moved on ball bearing wheels without the necessity of power propulsion. Most of the material picked up is separated by cyclonic precipitation into a can. Only residue dust and light bits of paper enter the filter bag. The large filter area bag allows air to escape without reducing velocity. Container and bag are removable and can be emptied and replaced quickly. This cleaner will pick up most industrial litter with the exception of wet, oily or sticky substances, hardware or similar objects, spherical objects or stiff or excessively large articles.



Feature of a new vacuum cleaner for industrial purposes is a large suction nozzle which is mounted in a fixed position

Motorless mechanical sweepers can be used as a substantial time-saving and labor-saving aid in sweeping floors of freight cars, shipping docks, and plant areas. These sweepers operate mechanically with no engine or motor to complicate performance. They simply are rolled along the floor by the operator.

As the wheels rotate, a brush inside the sweeper revolves in the opposite direction, whisking dirt, trash, dust, and debris forward into a detachable aluminum hopper easily emptied by one man. The amount of pushing effort required ranges between 9 and 11 lb, depending on the model and attachments. Sweeping paths range from 20 to 40 in. wide, and speeds, as shown by time studies, range from 15,000 to 22,000 sq ft per hr.

With manpower costs rising, the larger, more open work areas characteristic of new industrial buildings and the growth of automatic equipment, requiring increased maintenance attention, it is natural that more thought be directed to the floor cleaning phase of dust and debris elimination in good housekeeping programs.

Society Sponsors Contest

Malleable Founders' Society is sponsoring a contest open to employees of member companies for the best letter on accident prevention. Four cash prizes totaling $250 will be awarded the best letters of 1000 words or less. The winning letter will be published in FOUNDRY magazine. Contest closes Nov. 30 and the winner will be introduced at the Society's semiannual meeting in Cleveland in January.

Letter will be judged on originality and application to the foundry industry. Judges will be Paul Jones, director of public relations, National Safety Council; William G. Gude, managing editor, FOUNDRY; and William F. Davis, American Foundrymen's Society.

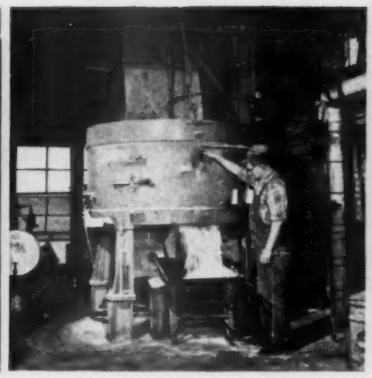
PS

PROVED SUPERIOR

ACME RESIN

1 MULLING, tacky stage. Cold sand, liquid resin, and catalyst are charged into a standard muller.

2 MULLING, free-flowing stage. Each grain of sand *uniformly coated* —no critical control necessary.



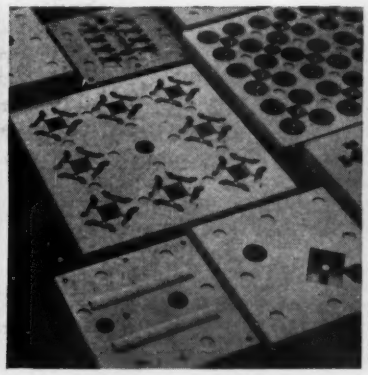
3 DISCHARGING. Sand is *dust-free*, cannot segregate from resin, green strength is controllable.

4 TWENTY-POWER magnificat of resin-coated grains of sa after mulling process.

PlastiSand PROCESS

Resin formulation and the coating process covered by Patents Pending

5 COATED SAND, ready for use. Extremely *high tensile strength* at resin contents of from 2% to 4%.



6 BLOWN SHELL CORES. *Non-segregating* qualities lend themselves perfectly to shell and core blowing techniques.

7 STACK POURING of Alnico magnets, 12 to 16 high. 2% of resin produces necessary *high strength*, saves time and space.

8 SHAKE OUT—good collapsil ity makes for easier shake and better cleanup.

Pictures courtesy Mr. Raymond Kelly, Superintendent, Arnold Engineering Foundry, Marengo, Ill.

PLASTISAND Process utilizes a revolutionary new method for coating sand with liquid-resin for foundry shell molding.

This new development by Acme Resin Corporation in the field of shell molding has several positive advantages that overcome the primary deterrents to the use of the more widespread "C" or shell molding process.

Foundries using the PLASTISAND Process report PROVED SAVINGS, PROVED SAFETY and PROVED SUPERIORITY of molds with as little as one-half the resin content formerly necessary with dry resin.

With the PLASTISAND Process, a shorter dwell is possible and a faster cure is assured, from a shorter time on the pattern and a faster baking cycle.

Acme's new PLASTISAND Process is adaptable to dump-box, roll-over and blowing of either shells or cores. It uses either hot or cold mulling—in both, Acme liquid resin is used.

An informative folder has been prepared to better acquaint the foundry industry with the new PLASTISAND Process. It may be obtained by writing to the ACME RESIN Corporation at the address listed here.

ACME RESIN CORPORATION

1401 CIRCLE AVENUE • FOREST PARK, ILLINOIS

METAL

20th Century

the persuasive abrasive

Make a mental note to specify 20th Century *Normalized shot or grit for your abrasive requirements. It's manufactured under close laboratory control to assure consistent high quality, greater uniformity and longer wear.

Foundries and metal-working plants throughout the United States and Canada have found 20th Century *Normalized, the persuasive abrasive, the answer to maximum production efficiency and economy.

Write for our new catalog No. 1153.

THE CLEVELAND Metal Abrasive CO.

800 East 67th Street • Cleveland 8, Ohio
Howell Works: Howell, Michigan

Various parts for these Caterpillar-built D8 tractors are peened and cleaned by 20th Century metallic abrasives.

*One of the world's largest producers of quality shot, grit and powder — Hard Iron — Malleable (*Normalized) — Cut Wire — Cast Steel (Realsteel)*

** Copyrighted trade name*

FOUNDRY STATISTICS

MALLEABLE IRON

(Shipments of castings—net tons[1])

	Shipments—Total	Shipments—For Sale	Unfilled Orders[2]
1952	926,120	573,472	.....
1953			
July	77,111	45,413	137,251
7 mo.	609,843	364,260	.....
Aug.	73,855	45,415	120,801
Sept.	74,333	45,466	114,523
Oct.	73,473	45,515	104,046
Nov.	63,435	37,500	93,156
Dec.	72,126	39,657	95,612
Total	967,065	577,813	.....
1954			
Jan.	70,288	38,266	85,565
Feb.	69,078	37,792	81,579
Mar.	84,342	47,125	74,219
Apr.	74,515	39,102	69,094
May	67,856	37,306	67,040
June	72,820	41,121	60,163
July	50,893	25,243	63,711
7 mo.	479,792	265,955	.....

ALUMINUM

(Shipments of castings—1000 pounds)

	Shipments—Total	Sand	Perm. Mold	Die	Unfilled Orders[2]
1952	518,979	194,616	146,883	169,732	.....
1953					
July	51,196	16,614	15,692	18,549	125,330
7 mo.	396,606	132,182	117,251	145,096	.....
Aug.	50,428	15,940	16,252	17,837	126,781
Sept.	53,306	17,826	17,189	17,875	120,828
Oct.	55,097	17,171	17,030	20,547	115,189
Nov.	51,014	16,169	15,396	19,012	106,977
Dec.	51,571	15,265	16,907	18,963	105,980
Total	658,022	214,553	200,025	239,330	.....
1954					
Jan.	51,446	14,698	16,615	19,709	103,318
Feb.	51,213	14,696	17,281	18,754	96,011
Mar.	56,184	14,468	19,576	21,645	93,407
Apr.	53,006	14,073	18,091	20,366	91,853
May	47,663	12,461	16,312	18,368	83,848
June	48,061	12,442	17,105	17,886	79,126
July	39,636	11,259	13,749	14,004	76,513
7 mo.	347,209	94,137	118,729	130,732	.....

COPPER-BASE ALLOY

(Shipments of castings—1000 pounds[1])

	Shipments—Total	Sand	Perm. Mold	Unfilled Orders[2]
1952	1,009,910	910,862	63,865	.....
1953				
July	69,957	63,365	3,927	60,381
7 mo.	596,893	537,682	35,219	.....
Aug.	77,652	69,852	4,890	61,646
Sept.	79,595	71,184	5,273	57,209
Oct.	83,899	74,460	5,775	51,723
Nov.	74,782	66,370	5,077	48,842
Dec.	77,675	68,821	5,082	48,421
Total	990,496	888,369	61,316	.....
1954				
Jan.	71,437	63,034	4,618	42,351
Feb.	68,849	60,913	4,743	21,943
Mar.	76,480	67,952	5,123	38,417
Apr.	72,900	65,418	4,732	34,111
May	67,859	61,469	3,755	31,568
June	70,777	64,328	3,567	30,743
July	56,380	51,070	3,073	30,872
7 mo.	484,682	434,184	29,656	.....

MAGNESIUM

(Shipments of castings—1000 pounds[1])

	Shipments—Total	Shipments—For Sale	Unfilled Orders[2]
1952	34,857	32,977	.....
1953			
July	2,287	2,079	13,927
7 mo.	21,176	19,382	.....
Aug.	2,490	2,281	13,202
Sept.	2,455	2,238	12,528
Oct.	3,024	2,717	11,473
Nov.	2,681	2,417	10,612
Dec.	2,691	2,434	9,313
Total	34,517	31,469	.....
1954			
Jan.	2,451	2,149	8,800
Feb.	2,194	1,945	8,315
Mar.	2,407	2,109	7,698
Apr.	2,068	1,857	7,358
May	1,738	1,541	7,522
June	2,034	1,820	8,296
July	1,924	1,712	8,073
7 mo.	14,816	13,133	.....

PRODUCTION WORKERS

Estimated Number

(Thousands)

	June 1954	May 1954	June 1953
Ferrous	191,800	190,400	225,900
Nonferrous	57,400	57,600	78,000

Average Weekly Earnings

	June 1954	May 1954	June 1953
Gray Iron	$73.12	$72.56	$76.58
Malleable Iron	71.06	72.01	79.52
Steel	74.65	73.48	81.95
Nonferrous	79.19	79.00	80.97

Average Weekly Hours

	June 1954	May 1954	June 1953
Gray Iron	39.1	38.8	41.5
Malleable Iron	37.6	37.7	41.2
Steel	37.7	37.3	41.6
Nonferrous	39.4	39.5	41.1

Labor Turnover Rate (June)

(Per 100 employees)

	Total Accession	Total Separation	Quit	Layoff
Gray Iron	3.3	4.5	0.8	3.2
Malleable Iron	2.5	2.5	0.9	1.0
Steel	2.9	4.1	0.7	2.9
Nonferrous	3.2	4.4	0.9	2.7

Source: Bureau of Labor Statistics

GRAY IRON CASTINGS—SHIPMENTS

(Net tons[1])

	All Castings—Total	All Castings—For Sale	Miscellaneous Castings—Total	Miscellaneous Castings—For Sale	Heavy Steel Ingot Molds—Total	Heavy Steel Ingot Molds—For Sale	Chilled Railroad Car Wheels—Total	Pressure Pipe & Fittings Total[3]	Soil Pipe & Fittings Total[3]	Unfilled Orders[2]
1952	12,862,494	7,373,757	8,095,299	3,794,164	2,238,309	1,070,252	544,896	1,312,518	651,472	.....
1953										
July	1,056,422	573,280	652,371	274,890	212,187	106,526	36,715	97,739	57,410	1,232,651
7 mo.	8,277,445	4,450,580	5,182,759	2,211,296	1,660,846	805,444	302,726	747,065	394,049	.....
Aug.	1,069,392	588,543	646,902	286,449	217,930	107,428	40,327	107,805	56,428	1,222,612
Sept.	1,105,582	611,905	669,225	289,909	232,055	117,694	37,055	108,270	58,977	1,170,191
Oct.	1,141,526	650,229	669,757	300,249	245,966	124,177	41,917	118,306	65,580	1,075,538
Nov.	1,004,326	563,930	589,657	266,039	227,800	111,022	31,373	101,576	53,920	977,012
Dec.	1,032,444	552,565	634,250	274,203	228,532	108,700	30,051	94,053	45,558	954,885
Total	13,630,715	7,417,752	8,392,550	3,537,645	2,813,129	1,374,465	473,449	1,277,075	674,512	.....
1954										
Jan.	932,298	488,497	607,755	261,164	154,359	60,947	31,316	90,898	47,970	871,918
Feb.	936,364	491,983	607,085	252,591	156,933	70,261	29,240	92,546	50,560	865,344
Mar.	1,046,779	553,358	684,272	282,328	153,366	65,950	34,240	113,016	61,895	842,499
Apr.	995,052	528,027	657,126	263,147	126,083	56,114	29,075	116,420	66,348	826,491
May	943,335	516,475	605,385	247,623	122,839	57,106	27,144	122,514	65,453	775,278
June	986,810	556,047	616,317	261,133	141,712	70,060	30,883	130,503	67,395	803,570
July	821,151	449,621	510,173	209,294	131,180	62,681	22,902	98,810	59,086	828,924
7 mo.	6,661,789	3,584,208	4,288,113	1,777,280	986,472	443,119	204,800	764,707	418,707	.....

STEEL CASTINGS—SHIPMENTS

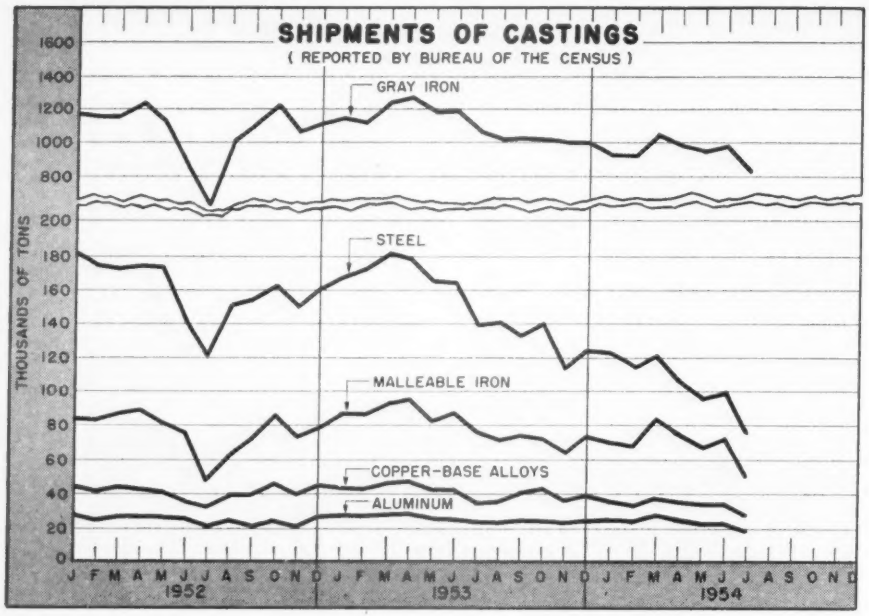
(Net tons[1])

	All Castings—Total	All Castings—For Sale	All Castings—Railway Specialties	Carbon Steel—Total	Carbon Steel—For Sale	Carbon Steel—Railway Specialties	Alloy Steel—Total	Alloy Steel—For Sale	Alloy Steel—Railway Specialties	Unfilled Orders[2]
1952	1,925,707	1,476,746	342,561	1,496,450	1,053,264	298,948	553,403	430,493	40,613	.....
1953										
July	139,577	105,687	22,925	95,891	71,488	20,938	43,686	34,532	1,987	467,900
7 mo.	1,174,573	904,386	211,563	828,126	632,241	193,193	346,457	275,538	18,370	.....
Aug.	141,340	107,941	25,026	97,076	73,784	22,637	44,264	35,003	2,389	418,927
Sept.	135,303	102,880	24,108	95,944	72,780	21,724	39,359	30,338	2,384	327,172
Oct.	140,702	106,788	25,354	100,568	76,118	23,449	40,134	30,988	1,905	313,684
Nov.	114,088	84,945	17,784	79,989	57,947	16,233	34,099	27,167	1,551	308,526
Dec.	123,281	91,017	18,685	86,465	62,377	16,998	36,674	29,952	1,687	278,389
Total	1,829,287	1,397,957	322,520	1,288,168	975,247	294,234	540,977	428,986	28,286	.....
1954										
Jan.	122,758	93,577	20,197	83,927	62,749	18,407	38,831	30,828	1,790	251,847
Feb.	116,520	88,699	17,938	81,433	60,638	15,961	35,087	28,061	1,967	234,634
Mar.	122,310	92,271	15,684	85,211	62,955	14,190	37,099	29,316	1,494	214,367
Apr.	105,788	78,754	11,031	72,118	52,389	9,538	33,670	26,365	1,493	197,857
May	94,610	70,596	9,454	64,546	46,651	8,342	30,064	23,945	1,112	182,502
June	100,022	72,881	8,639	69,021	48,327	7,552	31,001	24,554	1,087	169,594
July	75,848	53,207	5,815	50,453	33,461	4,964	25,125	19,746	851	194,378
7 mo.	737,856	549,985	88,758	506,709	367,170	78,954	230,877	182,815	9,794	.....

[1]Source: Bureau of Census. [2]For sale only. [3]All cast iron pipe is shipped for sale.

(Concluded on page 178)

FOUNDRY STATISTICS (Concluded from page 177)



INDEX OF FOUNDRY EQUIPMENT ORDERS

Foundry Trades Only

(Net Orders Closed, New Equipment)

	1953	1954
Jan.	99.6	173.8
Feb.	97.5	99.9
Mar.	132.2	82.7
Apr.	111.8	125.3
May	152.7	80.8
June	156.8	86.4
July	159.2	68.8
Aug.	236.3	75.6
Sept.	127.7	....
Oct.	87.2	....
Nov.	150.0	....
Dec.	161.2	....

Note: Figures are percentages of the base period 1947-49 taken as 100 per cent (monthly average). This is a new base period. Source: Foundry Equipment Manufacturers Association.

INGOT BRASS & BRONZE

(Shipments in net tons)

	1953	1954
Jan.	24,423	20,661
Feb.	25,429	19,920
Mar.	28,256	23,653
Apr.	25,044	24,746
May	21,660	22,269
June	20,818	22,348
July	19,321	21,684
Aug.	20,156	.....
Sept.	21,463	.....
Oct.	22,280	.....
Nov.	21,860	.....
Dec.	20,541	.....
Total for year	271,251	.....

ZINC-BASE ALLOY

(Shipments of castings—1000 pounds[1])

	Shipments—Total	Shipments—For Sale	Unfilled Orders[2]
1952	408,353	282,673	.....
1953			
July	38,968	24,829	83,508
7 mo.	327,631	217,210	.....
Aug.	37,800	23,817	78,303
Total	521,253	349,022	.....
1954			
Feb.	37,660	24,112	55,351
Mar.	42,991	28,828	52,544
Apr.	38,968	25,211	51,388
May	36,793	23,671	46,726
June	40,708	26,890	47,537
July	28,306	18,605	43,231
7 mo.	265,822	174,574	.....

COKE PRODUCTION & CONSUMPTION

(Net tons)

	Production	Consumption—Total	Consumption—By Foundries
1952	68,254,109	67,865,639	3,102,446
1953			
July	6,748,229	6,654,080	217,504
7 mo.	46,487,920	46,673,159	1,779,019
Aug.	6,719,941	6,587,005	236,738
Sept.	6,404,143	6,330,441	236,119
Oct.	6,554,638	6,555,613	236,329
Nov.	6,208,155	6,039,813	216,837
Dec.	6,093,009	6,041,363	210,388
Total	78,467,806	78,227,414	2,915,420
1954			
Jan.	5,812,426	5,639,117	224,298
Feb.	4,889,717	4,920,671	211,114
Mar.	5,146,189	5,177,765	228,139
Apr.	4,693,036	4,569,843	212,272
May	4,802,245	4,636,950	204,958
June	4,640,064	4,673,726	194,664
July	4,618,665	4,555,701	170,617
7 mo.	34,602,342	34,203,753	1,446,062

PIG IRON PRODUCTION AND CONSUMPTION

	Production** (Standard grades—net tons) Total	Foundry	Malleable	Basic	Low Phos. Intermediate Low Phos. & Bessemer	Consumption* (By type of furnace—gross tons) Total	Cupola	Air	Electric
1952	61,306,723	2,864,722	3,013,267	48,253,390	7,175,344	61,550,961	5,438,294	449,646	118,820
1953									
Aug.	6,381,056	202,116	310,717	5,167,059	701,164	5,672,037	385,003	20,829	14,206
8 mo.	50,639,419	1,797,673	2,581,495	40,878,190	5,652,089	45,109,058	3,412,051	193,063	106,619
Sept.	6,121,399	209,444	310,441	4,926,986	674,528	5,378,517	393,292	21,775	16,039
Oct.	6,409,245	218,880	290,882	5,175,064	724,479	5,733,466	395,066	21,349	13,206
Nov.	5,995,511	201,047	277,181	4,859,252	658,031	5,324,537	343,233	17,528	15,842
Dec.	5,712,937	172,293	276,432	4,625,524	638,698	5,091,786	374,838	18,596	12,561
Total	74,878,511	2,599,307	3,736,431	60,465,016	8,347,817	66,637,364	4,918,480	272,311	164,267
1954									
Jan.	5,531,137	184,629	294,691	4,510,870	540,947	4,933,282	362,576	17,620	14,578
Feb.	4,764,613	156,178	272,707	3,911,670	424,058	4,293,942	351,824	17,257	9,892
Mar.	4,907,147	213,249	243,356	3,977,137	473,405	4,367,814	390,929	21,369	13,112
Apr.	4,449,289	155,249	256,662	3,630,901	406,477	4,021,957	375,045	26,553	10,497
May	4,572,252	154,768	231,479	3,741,671	444,334	4,188,269	367,437	16,453	16,531
June	4,683,629	175,759	200,154	3,853,444	454,272	4,297,531	375,601	18,545	14,196
July	4,590,076	182,130	182,527	3,790,999	434,420	.....	.....	.....	.....
Aug.	4,529,291	186,097	165,891	3,722,094	455,209	.....	.....	.....	.....
8 mo.	38,027,434	1,408,059	1,847,467	31,138,786	3,631,792	.....	.....	.....	.....

IRON AND STEEL SCRAP CONSUMPTION

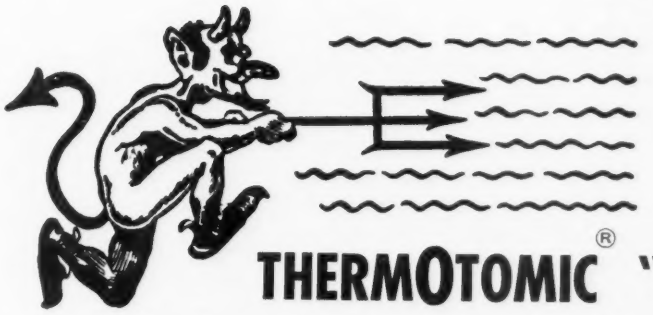
(Gross tons*)

	All Scrap—Total	All Scrap—Purchased	By Types of Furnace—Cupola—Total	Cupola—Purchased	Air—Total	Air—Purchased	Electric—Total	Electric—Purchased
1952	61,625,549	30,520,946	9,154,146	4,752,497	1,053,233	395,591	8,015,064	5,190,833
1953								
May	6,294,920	3,105,598	861,404	450,477	92,703	35,566	798,098	523,606
June	5,951,170	2,835,875	876,320	454,905	99,799	38,934	743,530	468,129
6 mo.	37,069,618	18,058,929	5,189,728	2,679,954	589,786	225,016	4,760,506	3,083,182
July	5,539,468	2,597,365	729,114	369,283	74,815	26,755	691,521	443,263
Aug.	5,637,759	2,614,153	753,272	390,741	77,047	28,167	678,968	428,332
Sept.	5,395,721	2,393,773	782,131	405,274	80,866	29,032	595,523	363,706
Oct.	5,628,568	.....	779,444	.....	75,618	.....	566,878	.....
Nov.	5,064,565	.....	687,498	.....	60,200	.....	477,666	.....
Dec.	4,690,277	.....	755,276	.....	68,002	.....	442,818	.....
Total	69,005,976	.....	9,676,463	.....	1,026,334	.....	8,263,880	.....
1954								
Jan.	4,574,384	.....	711,335	.....	71,202	.....	505,536	.....
Feb.	4,385,340	.....	704,535	.....	67,263	.....	462,095	.....
Mar.	4,637,573	.....	783,529	.....	82,337	.....	517,702	.....
Apr.	4,582,862	.....	748,766	.....	79,183	.....	518,048	.....
May	4,776,603	.....	710,159	.....	67,368	.....	506,582	.....
June	4,664,761	.....	725,910	.....	75,306	.....	515,019	.....
6 mo.	27,621,323	.....	4,384,234	.....	442,659	.....	3,024,982	.....

*Source: U. S. Dept. of Interior, Bureau of Mines. **Source: American Iron & Steel Institute. [1]Source: Bureau of the Census. [2]For sale only.

Produce More Castings Per Heat

with



Soffel's

THERMOTOMIC® "HOTOP" LIQUIDIZER

Exothermic Carbon Free Liquidizer For Iron, Steel, Nodular Iron

This new head compound saves feeding metal in risers or feeding heads which can now be reduced in height 40 to 70%

SOFFEL'S THERMOTOMIC HOTOP CARBON FREE LIQUIDIZER is different from other head compounds in that HOTOP LIQUIDIZER does NOT contain powdered metal, is NOT a thermit compound. It is a patented exothermic compound entirely free of carbon, sulfur and phosphorus and can be used without danger of contamination on any ferrous metal or alloy.

HOTOP LIQUIDIZER also saves molding time as less sand is needed in the mold cope due to short height of risers. HOTOP LIQUIDIZER produces a liquid slag well over 4000° F. of heat and insulates the metal. The feeding metal will remain liquid at least 50% longer assuring adequate feeding while the casting cools and solidifies. Piping and shrink cavities caused by premature freezing of the feeding metal are eliminated.

GUARANTEED TO PRODUCE SOLID CLEAN CASTINGS

SOFFEL'S FAMOUS CARBON FREE LIQUIDIZER FOR ALL METALS and ALLOYS

SOFFEL'S EXOTHERMIC CARBON FREE LIQUIDIZER is the leader in major foundries for use on both ferrous and non-ferrous metals and also in ingot production. It is the original scientific non-carbon, exothermic compound for feeding heads and risers.

When applied on the heads or risers CARBON FREE LIQUIDIZER reacts within itself exothermically, producing a temperature above 3200° F. It actually increases the temperature of the feeding metal to a point well above that of the metal in the main body of the casting, thus ensuring that the feeding metal will be the last to freeze. In this manner, shrink cavities in the casting caused by premature freezing of the feeding heads will be eliminated. After the exothermic action has ceased, the LIQUIDIZER forms a soft refractory insulating blanket on the metal. This confines the heat generated by the LIQUIDIZER and aids in maintaining the desired high temperature of the feeding metal in the heads or risers.

SOFFEL'S THERMOTOMIC COMPOUND
PATENTED
FOR ALL METALS and ALLOYS

THERMOTOMIC COMPOUND is a patented Exothermic compound that can be molded into any desired shapes and used as feeding ring inserts under risers or as facing application where it is desired to maintain fluidity of the casting metal. THERMOTOMIC permits reversal of the trend towards large feeding heads and risers, making it possible to use heads that are shorter and more compact with 1½" feeder openings. This permits easy removal of the casting feeding heads and sharp reductions in cleaning and finishing costs. When THERMOTOMIC is used as inserts or as facing mixed with molding sand in the mold, heat at thin metal sections is retained until the thick main body of the casting has solidified, thus eliminating shrink cracks and improving grain structure and tensile strength. For use in green sand molds, use THERMOTOMIC W. P. (Waterproofed)

NOTE: SOFFEL'S CARBON FREE LIQUIDIZER NO. 5 is recommended for use on top of feeding heads in conjunction with THERMOTOMIC COMPOUND. For aluminum castings, use THERMOTOMIC ABC and AL-X31 LIQUIDIZER. When ordering a trial sample, advise the kind of metal to be used on.

U. S. Patents No. 2,490,327 and No. 2,500,097

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World's Largest Manufacturer of Fluxes and Purifiers For All Metals and Alloys

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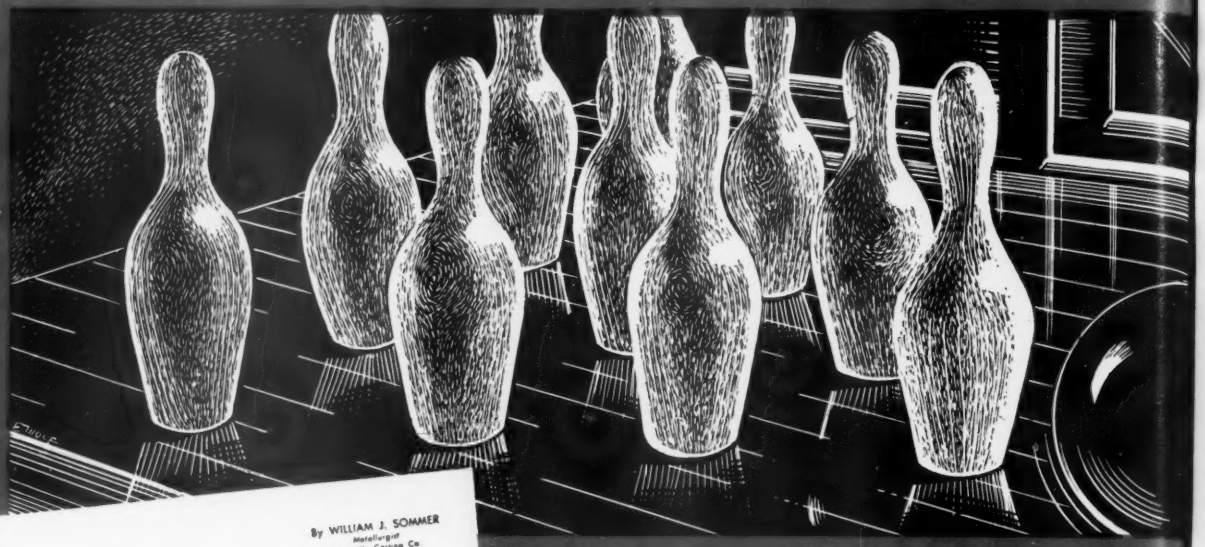

By WILLIAM J. SOMMER
Metallurgist
Plainville Casting Co
Plainville, Conn.

Quality Control:
IT'S IN THE REACH OF SMALL FOUNDRIES

Look at your inspection setup. If you're making chemical analyses, inspecting patterns, or castings, chances are you have basic elements needed to start quality control program

WITH THE foundry industry as a whole becoming more and more quality conscious and the larger companies setting up elaborate quality control programs, many ...ller foundri... ...g to ...let ...

...ing group are all too interested in getting the work out and meeting delivery dates. If possible by-pass your standards department or time study men. Their chief concern is getting rate of ... up and ...rd de... ...costs dow... ...

...reason for the scrap. The type of scrap record you keep is optional, but it should contain such pertinent data as date, customer's name, pattern number, total cast... total scrap... ...akdown of scrap...

let uniform DIXIE BOND help you obtain quality control

Uniformity in materials all through the plant, — that is one big, indispensable aid toward the all-important end of quality control. Your molding sand must be uniform. For that uniformity you can depend upon Dixie Bond, produced under the strictest of laboratory control.

That isn't all. With Dixie you get also fast, easy shake-out; longer-lived flasks, more crack-less castings. You benefit from moderate dry and hot strength, the highest green strength known to the industry, high permeability, high flowability, and a high sintering point.

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DIXIE BOND *bulletin*

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SPECIAL REFRACTORIES

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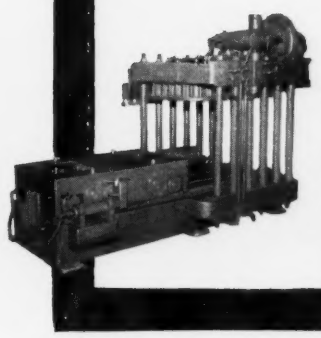
HTR Plastic Brick
HTR High Temperature Cement
HTR Castable

FOUNDRY EQUIPMENT

Dura Products
Bondactor Refractory Gun
Taccone Diaform Molding Machine



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STANDARD REFRACTORIES

Revivo Fire Clay — Cupoline
Lawco Fire Clay — Superline
Bondact Fire Clay — Hyline
Cupoline Plastic — Pitline
Cupoline Ladle Mix

Many of today's accepted foundry practices such as synthetic sand, southern bentonite, chemical sand additives, cupola "gun patching" and pressure and diaform molding stem from *Eastern Clay's* pioneering, research and developments in materials, equipment and methods.

You can get from *Eastern Clay* this wide variety of materials and equipment plus modern technical know-how on improved operating efficiencies and the production of finer quality castings.

So call your *Eastern Clay* representative. You'll get prompt, understanding and helpful cooperation.

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- CUPOLA PATCHING
- PATCHING WITH CUPOLINE
- THE BONDACT PROCESS

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ACTIVITIES OF FOUNDRY GROUPS

NORTHERN CALIFORNIA Chapter of the AFS met recently at the Sea Wolf, Oakland, for the first meeting of the 1954-55 season. The board of directors is pictured above. Front row, left to right, are Nino Davi, Pacific Steel Castings Co., Roy Hoag, General Metals Corp., and Harold Henderson, H. C. Macaulay Foundry Co. Back row, left to right, are Gordon Martin, Atlas Foundry & Mfg. Co., C. Marshall, Industrial Foundry & Supply Co., H. Hirsch, Amsco Division, American Brake Shoe Co., and W. Skinner, Pacific Graphite Co.

Wisconsin

FIVE talks featured the Sept. 10 meeting of the Wisconsin Chapter of the AFS at the Hotel Schroeder, Milwaukee. Harry J. O'Neill, International Harvester Co., Chicago, addressed the malleable iron group on "What a Customer Expects from a Producer of Malleable Castings." C. E. Christopher, Continental Foundry & Machine Co., E. Chicago, Ind., talked to the steel group on "The Effect of Pouring Temperature on the Soundness and Physical Properties of Steel Castings." Gray iron group heard a talk by J. M. Crockett, Air Reduction Co., New York, on "Changes in Iron Structures and Composition by Means of Carbide Injection."

W. B. George, R. Lavin & Sons, Chicago, discussed with the nonferrous group various aspects of "Brass and Bronze Foundry Practice." The pattern group heard Clarence Schmidlin, Accurate Match Plate Co., Chicago, talk on "Pressure Cast Plates and Core Boxes." Chapter members Fred E. Katzenski, E. G. Tetzlaff, P. C. Rosenthal, Otto Sadofsky, and H. W Stokes served as chairmen, respectively, of the various sectional meetings.—*John E. Hubel.*

Central Illinois

CENTRAL Illinois Chapter of the AFS met Sept. 11 at the 497th Engineers Club grounds at Groveland, Ill., for their annual fish fry. Games, movies and refreshments were on the program. The first fall meeting was scheduled for Oct. 4 with A. A. Agostini, plant manager, Grede Foundries, speaking on "The Relationship of the President and the Sweeper."—*Clarence J. Turner, Caterpillar Tractor Co.*

Chicago

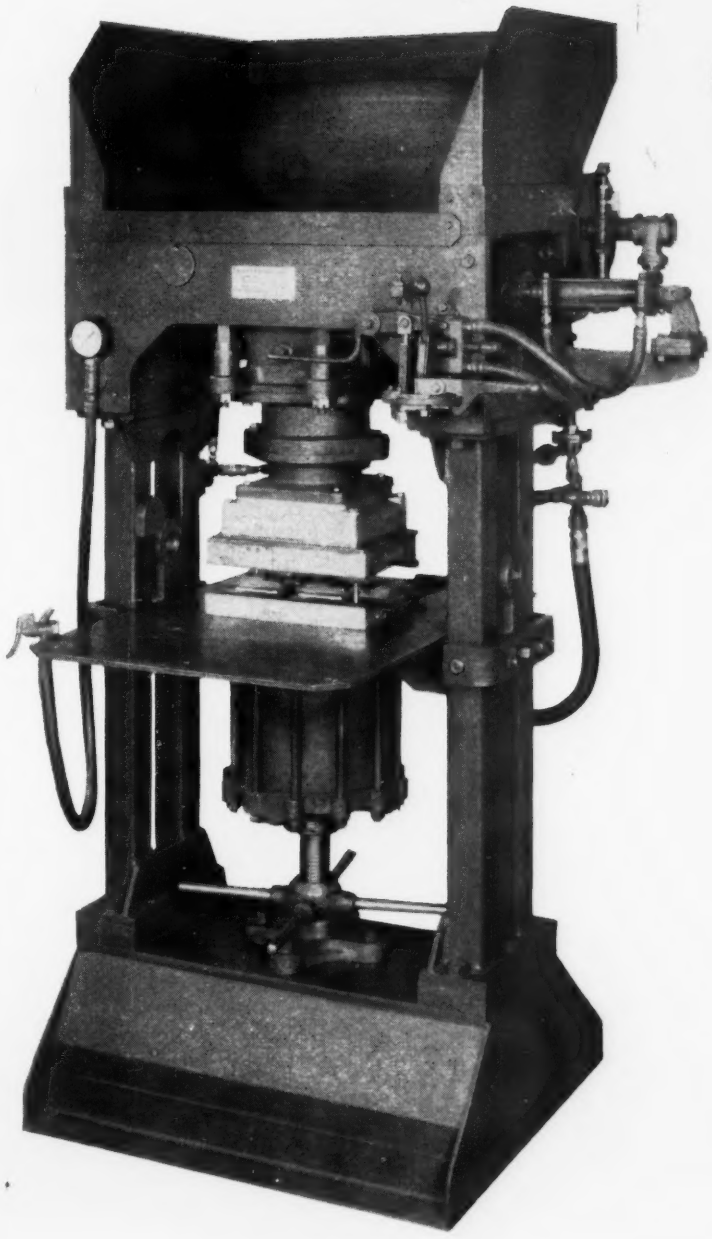
ABOUT 175 members and guests of the Chicago Chapter of the AFS met Oct. 4 at the Chicago Bar Association to initiate its 1954-55 program. Allen A. Evans, special assignments, International Harvester Co., Indianapolis, was the guest speaker on "Practical Applications of Foundry Quality Control."

Robert L. Doelman, Miller & Co., chapter chairman, presided at the general meeting. James T. Moore, Wells Mfg. Co. chapter vice chairman

(*Continued on page* 184)

WISCONSIN Chapter of the AFS met Sept. 10 at Hotel Schroeder, Milwaukee, to hear talks in five sectional meetings. Some of the speakers are pictured above. Left view, left to right, Fred E. Katzenski, International Harvester Co., chairman of the malleable group, with H. J. O'Neill, International Harvester Co., whose subject was "What a Customer Expects from a Producer of Castings." Center view, left to right: J. J. Broecker, Lakeside Malleable Castings Co. and P. C. Rosenthal, University of Wisconsin, cochairmen of the gray iron group, and J. M. Crockett, Air Reduction Co., who spoke on "Changes in Iron Structure and Composition by Means of Carbide Injection." Right view, left to right; H. W. Stokes, Waukesha Foundry Co., chairman of the pattern group, and Clarence Schmidlin, Accurate Match Plate Co., who talked on "Pressure Cast Plates and Core Boxes." Photographs are through courtesy of Walter V. Napp, Delta Oil Products Co.

Redford No. 4-D DRAW TYPE CORE BLOWER



Designed primarily to fill the need for a fast and flexible draw type machine to handle work from a few ounces to 10 lbs., the Redford #4-D can be quickly adjusted to accommodate core boxes not requiring the draw feature, or can be equipped with a clamp to handle vertically parted core boxes.

Rugged construction, simplicity of change-overs and a fast operating cycle make it suitable for either jobbing or high production work.

Exhaust air is utilized to thoroughly fluff the sand remaining in the sand magazine after each blow, thus reducing the possibility of cratering.

The stationary sand magazine and accurately guided draw table assure perfect drawing of the cores. Vibration of the core box is automatic.

Magazine heads normally furnished with the #2 Redford machine can be used with the #4-D Redford. Larger new type magazine heads especially suited for draw type work are also available as standard equipment.

Valves are designed to assure maximum safety. The operator must use both hands at the same time in order to clamp the core box.

The Redford #4-D has been thoroughly proven in both small and large foundries. To get complete information write for Bulletin 4-D.

Redford IRON & EQUIPMENT CO.

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(*Continued from page* 182)
and program committee chairman, previewed the year's activities. Clifford Sorensen, National Malleable & Steel Castings Co., membership committee chairman, reported on activities of his group.

Mr. Evans emphasized that foundry quality control is no different from any other type of quality control except that foundries have more variables to cope with. Using slides freely, he enumerated some of the things to watch for in quality control. Sand properties, core hardness and accuracy, mold hardness, core blows, metal fluidity, pouring time, and core oil properties were covered in the talk—*Erle F. Ross.*

Mo-Kan

FOLLOWING officers have been elected for the 1954-55 season of the Mo-Kan Chapter of the AFS: Chairman, Lloyd Canfield, Canfield Foundry Supplies & Equipment Co.; vice president, Henry Deterding, Sonken-Galamba Corp.; secretary, Howard Julian, Blue Valley Foundry, and treasurer, H. P. Schwickrath, Prier Brass Mfg. Co.

Board of directors is composed of R. A. Posch, Arpocalloy Co., E. C. Sooy, K. C. Hay Press Co.; Walt Collins, Superior Brass & Aluminum; Tom Shadwick, Witte Engine Works, and John Redman, Redman Pattern Works. Les Draper, Fairbanks, Morse & Co., is the chairman of the educational committee. Ed Hayden, Neville Foundry Co., will head the membership committee, and C. W. Boettcher, Black, Sivalls & Bryson, will be in charge of chapter publicity.

About 40 members and guests attended the Sept. 15 meeting at the Fairfax Airport Restaurant, Kansas City, Kansas. O. J. Myers, Archer-Daniels-Midland Co., spoke on "Core Sand."—*C. W. Boettcher, Black, Sivalls & Bryson Inc.*

PORITE Ceramic Strainer Cores Replace Sand Strainer Cores

Porite ceramic strainer cores are rapidly replacing sand strainer cores in efficient foundries everywhere. Records show...that for results obtained... ceramic strainer cores cost far less than sand strainer cores. Porite ceramic cores *will* reduce casting rejects ... provide cleaner castings... while saving you money. Porite cores will not spall, erode or disintegrate during pouring—may be stored indefinitely.

Gear your foundry to this cost-cutting change! Make this free test...tell us the size and quantities of sand cores you now use—or send samples, and we will send you *free* Porite cores from our huge stocks of standard sizes. Write today.

MAKE THIS FREE TEST!

60 years

Porcelain Products, Inc.
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PP —INC.—

Western Michigan

ABOUT 800 foundrymen and their business associates attended the 14th annual stag picnic of the Western Michigan Chapter of the AFS at the Pontaluna Golf Club, Muskegon, Mich., Aug. 14. Baseball, golf, horse shoe pitching, group singing and a variety show were on the entertainment program. Attendance and contest prizes were donated by foundry suppliers and business organizations in the area.—*W. W. Hicks, Sealed Power Corp.*

Metropolitan Brass

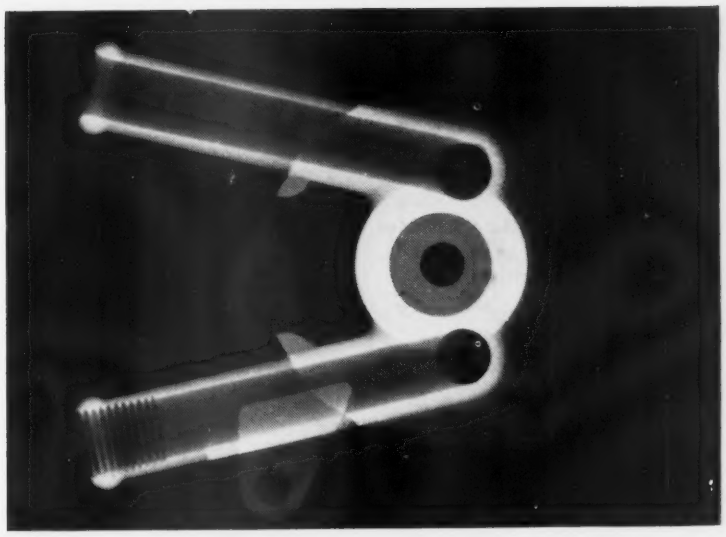
METROPOLITAN Brass Founders Association Inc., New York 57, will celebrate its forty-fourth anniversary on Nov. 6 with a dinner-show-dance at the Brass Rail Restaurant. A special journal is being planned for the occasion.—*George Staub.*

Washington

WASHINGTON Chapter of the AFS began its fall meetings Sept. 16 with a large turnout to hear Clifford E. Wenninger, National Engineering Co., Chicago, speak on "Digging Into Sand Fundamentals." Jim Hatchet, Dominion Steel Co., Vancouver, Canada, gave a short resume of the AFS Regional Conference that was to be held in Vancouver on Oct. 15-16.

Harold Wolfer, Puget Sound Naval Shipyard, introduced the speaker, who opened his remarks by stating that no shop can operate a sand department by any text book or written material from other foundries. The proper method is to first make a good

(*Continued on page* 186)



More for the money?

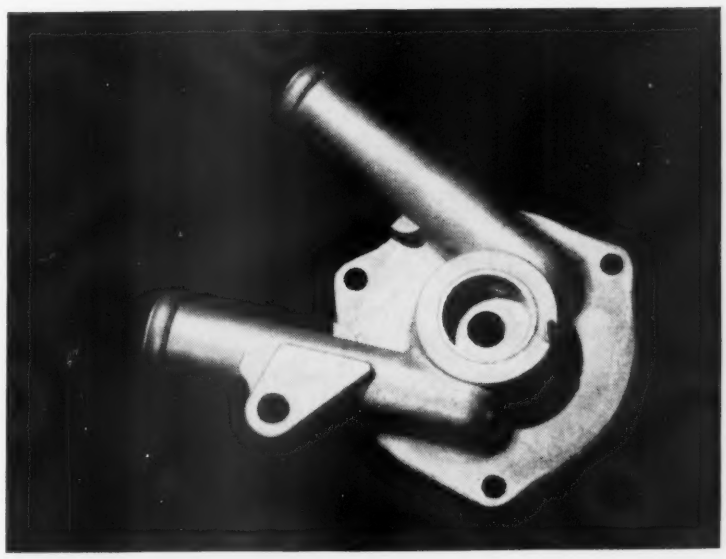
RADIOGRAPHY SHOWED HOW

This casting was a part for an automotive heater. With a big run and a low price, profit hinged on a high yield of sound castings.

Radiographs made of pilot castings revealed a few recurring faults and indicated how a minor change in casting technics could increase the yield.

This is just one more example that shows why it pays to use radiography—one more reason you find more and more progressive suppliers of castings using it.

If you want to be known for releasing only high-quality work, if you want to improve production—look into radiography. Your x-ray dealer will be glad to show you how it can help. And, if you wish, we'll send you a free copy of "Radiography as a Foundry Tool."



Radiography . . .

another important example of photography at work

EASTMAN KODAK COMPANY
X-ray Division, Rochester 4, N. Y.

Kodak

(*Continued from page* 184)
casting, then set your standards to that sand which makes the good castings.

Mr. Wenninger elaborated on the two fundamentals in preparing a proper sand for foundry use, namely, the mixing of the aggregates and the addition of bonding materials added to sands. Two types of agglomerating processes were presented—the plastic one, which is easy to get due to additions of clays and binders, and the systematic one, which is strength due to distribution and alignment of grains. The speaker discussed several types of bonding agents as well as pointing out the values to be derived from a sand testing department.—*William K. Gibb, Atlas Foundry & Machine Co.*

Southern California

FIRST meeting of the 1954-55 season for the Southern California Chapter of the AFS was held at Rodger Young Auditorium, Los Angeles, on Sept. 10 with about 88 members and friends attending. Charles Gregg, Gregg Iron Foundry, chapter chairman, presided. William Baud, Mechanical Foundries Div., Food Machinery Corp., chapter vice president and program chairman, introduced Clifford E. Wenninger, development engineer, National Engineering Co., Chicago, who spoke on "Digging Into Sand Fundamentals."

SOUTHERN CALIFORNIA, Northern California, Oregon and Washington Chapters of the AFS heard Clifford E. Wenninger, research director, National Engineering Co., Chicago, talk during September on "Digging Into Sand Foundamentals" on his tour of the West coast. Mr. Wenninger (above) is shown addressing the Oregon chapter. Photo is by Norman E. Hall, Electric Steel Foundry Co.

Mr. Wenninger covered sand and grain distribution and stated that grain distribution is the No. 1 sand control tool of the foundryman. He also asserted that good grain distribution is a prerequisite for strength and permeability tests. A question-and-answer period followed the talk.

November meeting is scheduled for Nov. 12 at Rodger Young Auditorium. T. E. Barlow, International Minerals & Chemicals Corp., will speak on "Pressure Molding."—*W. G. Stenberg, U. S. Electrical Motors Inc.*

Oregon

OREGON Chapter of the AFS met at the Columbia Athletic Club, Portland, Ore., on Sept. 15 to hear a talk on "Digging Into Sand Fundamentals" by Clifford Wenninger, research director, National Engineering Co., Chicago. The speaker stated that proper distribution and packing is the most important single factor of good sand. Distribution was said to be more important than clay content before additions are made. Sand is held together by surface films and it is possible to cast metal in sand mulled with water alone. Fillers increase surface area and give more green strength.

Wenninger stressed the importance

(*Continued on page* 189)

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Standard Fire Brick Products
Proven by Actual Foundry Service

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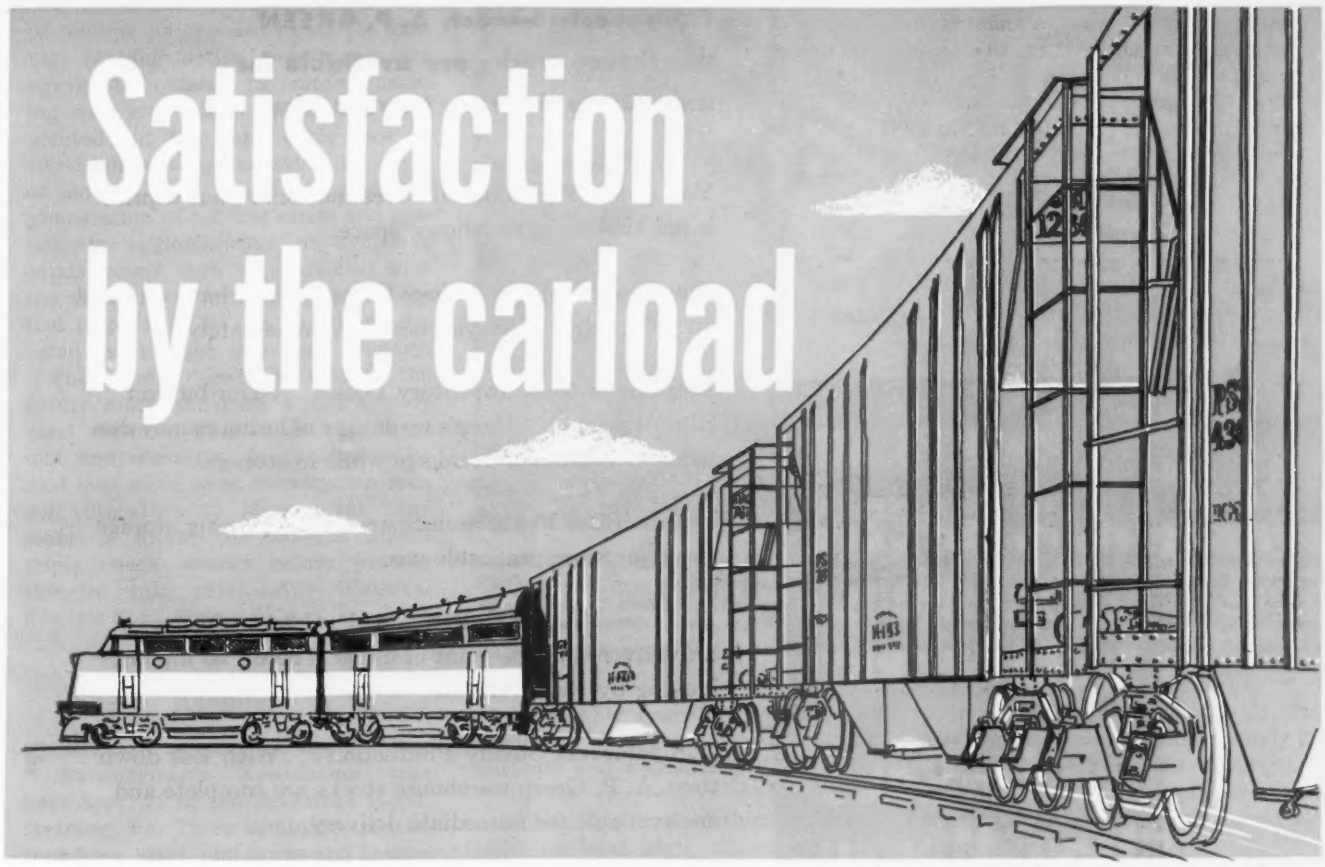

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Whether you order a bag or a carload, you are assured of the same steady quality that has earned for Ottawa sands, the distinction of being the world's finest.

Why not insure *your* next order with Ottawa's guarantee of satisfaction?

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You Maintain Steady Production . . . With less down time. A. P. Green warehouse stocks are complete and are available for immediate delivery.

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Toronto 15, Ontario

(*Continued from page* 186)
of mulling as opposed to simple mixing. Mulling action predisposes the aggregate material to uniform packing and also coats the grains. He pointed out that one cubic foot of 400-mesh material contains 1.8 acres of surface area. Plastic type of agglomeration of natural sands and systematic agglomeration of synthetic sands cannot both be controlled with the same set of principles. Sand control is peculiar to the conditions encountered in each individual foundry.

The speaker predicted that in the future most foundries would employ sand engineers as well as metallurgists and chemists. In conclusion he said that since most foundrymen consult literature to learn what they want to know, the experts should triple check results before putting theories into print.—*Bill Walkins, Electric Steel Foundry Co.*

TENNESSEE Chapter of the AFS held its annual picnic Sept. 10 at Camp Columbus, Lake Chickamauga, near Chattanooga, Tenn. About 400 members and guests, some of whom are shown above, attended. Charles Chisolm, Wheland Co., chapter chairman, was in charge of the arrangements. Horseshoes, softball, prize drawings and other entertainment highlighted the program. Photograph is through the courtesy of W. F. Hetzler, Eureka Foundry Co.

Reading

FIRST fall meeting of the Reading Foundrymen's Association was held Sept. 21 at the Berkshire Hotel, Reading, Pa. Three seminars on iron foundries, steel, and brass and bronze featured the program. James Woodward, Excelsior Brass Works, chapter chairman, presided.

Iron foundries discussion was led by James Stewart, Reading, with Rex Harrison Jr. as technical chairman. Philip Grimard, Lansdowne, Pa., led the discussion on steel and Daniel Heckman, Reading, was technical leader. Brass and bronze discussion was directed by Roger J. Keeley, H. Kramer & Co., Philadelphia. Edward Harkness, Reading, acted as technical chairman.

Prior to the group's next meeting members and visitors will tour Textile Machine Works, Reading.—*William I. Cassidy.*

Twin City

A WIDE variety of business was transacted at the Sept. 21 meeting of the Twin City Chapter of the AFS held at the Covered Wagon Restaurant, Minneapolis. James Ward, apprentice molder, Brom Machine & Foundry Co., was presented a $25 award for placing highest in the 1954 national apprentice contest from the Twin City district. Gus Degler, former apprentice patternmaker, American Hoist & Derrick Co., now in the Army, was notified of his $25 award for placing first in the district in the patternmaking division of the national apprentice contest.

D. B. Fulton, sales engineer, Northern Malleable Iron Co., presented an outline of a program aimed at tying students and apprentices more closely to the chapter by student night activities, plant visitations, member talks at local high schools, and increased publicity for the national apprentice contest. Chapter efforts have resulted in continuing a patternmaking course at St. Paul Vocational High School. Course was scheduled to be discontinued. H. J. Heine, technical director, AFS, appeared in the Twin City area in September and spoke on the future of the foundry industry to some 200 teachers and instructors.

Technical committee has been reactivated under directionship of Nate Levinsohn, Minneapolis-Moline Co. Technical sessions will cover three specific categories: Defective castings, cupola operation, and sand and sand control.

Program chairman H. H. Blosjo, Minneapolis Electric Steel Castings Co., introduced the guest speaker, J. D. Holtzapple, director of training and safety, Continental Foundry & Machine Co., E. Chicago, Ind., who outlined the safety practices and methods followed at his company. Employee cooperation was obtained when employees realized that man-

(*Continued on page* 192)

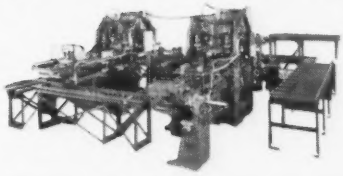
TWIN CITY Chapter of the AFS met Sept. 21 at the Covered Wagon Restaurant, Minneapolis, to hear J. D. Holtzapple, director of safety and training, Continental Foundry & Machine Co., discuss "Safety and Hygiene in the Foundry." Shown above, left to right, are Leo Brom, Brom Machine & Foundry Co., Jimmie Ward, local first-place apprentice molder in the 1954 national apprentice contest, J. W. Costello, American Hoist & Derrick Co., and William Armstrong, Brom Machine & Foundry Co. Mr. Ward is receiving a prize from the chapter for his contest efforts. Photograph is by the courtesy of R. J. Mulligan, Archer-Daniels-Midland Co.

"WE'VE GOT A

"That's right, son, we're competitive with the best of them . . . now that we've got our new SPOMATIC!"

A recent survey showed that many large jobbing and production foundries are being caught in "the middle." They are trying to meet stiffer competitive prices while operating antiquated inefficient equipment. With fully automatic molding machines making even "new" standard equipment obsolete almost overnight, survival will depend more than ever on the ability to produce more for less.

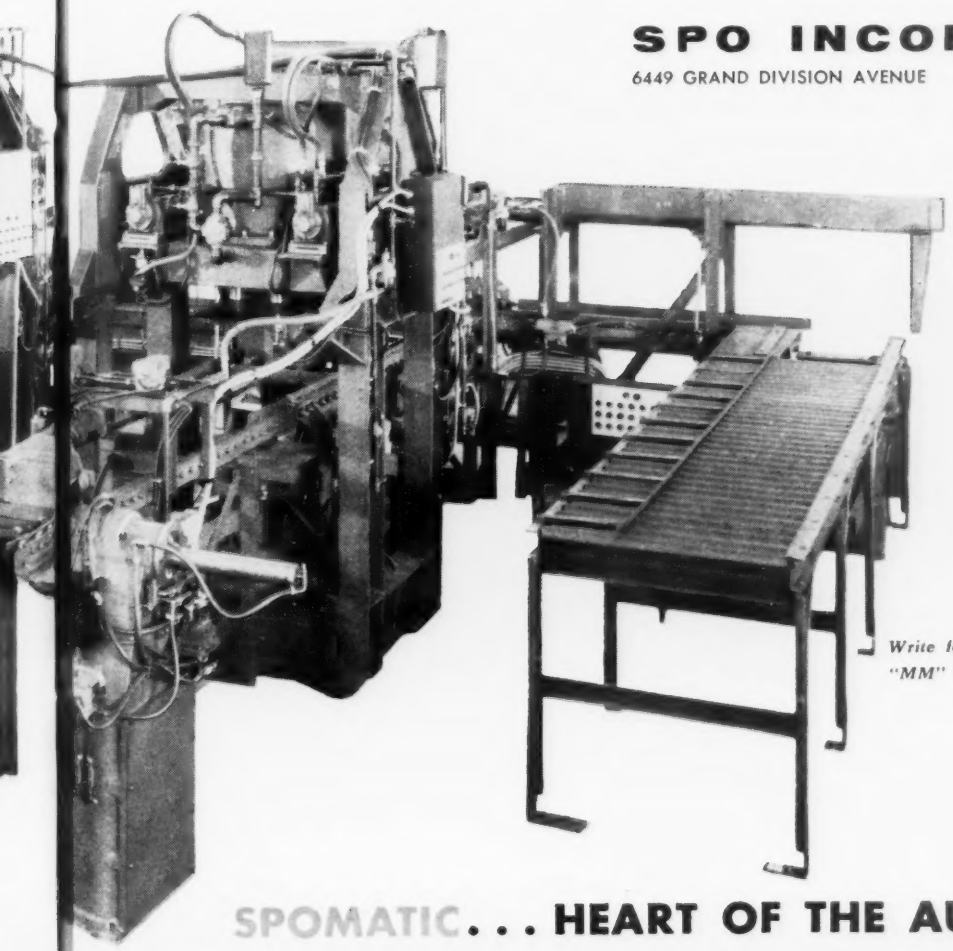
A HEAD START ON TOMORROW . . . TODAY!"



The SPOMATIC provides the most economical, high-speed, efficient means of automatic production molding available today. Operating with minimum supervision and effort, it will outproduce any other molding equipment. The SPOMATIC molds copes and drags simultaneously. Once it is started, all operations are fully automatic, mechanical and continuous.

The SPOMATIC will give you an edge on competition . . . permit tremendous savings that will amortize initial costs quickly . . . and will keep your production jobs profitable.

SPOMATIC installations are engineered to individual foundry requirements. SPO engineers will be glad to discuss your needs . . . to give you a head start on tomorrow today!



SPO INCORPORATED

6449 GRAND DIVISION AVENUE • CLEVELAND 25, OHIO

WORLD'S LARGEST SUPPLIERS SPO OF MOLDING MACHINES

Write for Bulletin "MM" for additional details.

SPOMATIC . . . HEART OF THE AUTOMATIC FOUNDRY

ACCO Registered* Slings

Photo courtesy Allis-Chalmers

It happens every day

• Maybe you have dropped a load in your shop. The damages, and loss of production, came to a pretty penny. But you can guard against such accidents by calling your nearby ACCO *Registered* Sling distributor.

From him you can get a variety of sling chains to the length you need, with your choice of sling, grab, or foundry hooks and fittings that will fit the sling exactly to your work. For instance, you can get ACCOLOY sling chains in sizes from ¼" to 1¼" that have four-leg working load limits from 9,500 lbs. to 199,000 lbs. at a 60° angle. These limits are not theoretical. They are based on actual proof-testing of each completed ACCO *Registered* Sling Chain to insure safe operation.

Don't wait until you have an accident. Check today with your ACCO *Registered* Sling distributor or write our nearest district office for further information.

WHAT "ACCO REGISTERED" MEANS...

1 The best material
2 Unit safety factor (on bodies, rings, links, hooks)
3 Proof test of complete sling to twice the working load limit
4 Actual field service test of each design
5 Metal identification ring on each sling
6 Signed Registry Certificate with each sling

*Trade Mark Registered

ACCO

TRADE MARK

American Chain Division
AMERICAN CHAIN & CABLE

York, Pa., Boston, Chicago, Denver, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, Portland, Ore., San Francisco, Bridgeport, Conn.

for Better Value

(*Continued from page* 189)

agement was vitally interested in employee safety. Departmental meetings, discussions, and planning periods have resulted in co-operative thinking and planning, increased interest among plant personnel, and a decreased accident rate in those shops that followed the program.—*R. J. Mulligan, Archer-Daniels-Midland Co.*

San Antonio

ELECTION of officers for 1954-55 was the main topic of business at the Aug. 23 meeting of the San Antonio section of the Texas Chapter of the AFS. Thirty-five members and guests attended the meeting held at the Alamo Iron Works. A first-aid film, "Handle With Care," was shown through the courtesy of the Aetna Insurance Co. Frank Roewer, Texalloy Foundry Co., spoke on the merits and limitations of Ni-hard and Ni-resist. Additional comments on these materials were made by Robert Hoffman.

Thirty-two members and guests attended the Sept. 27 meeting of the chapter, also held at the Alamo Iron Works. A safety film, "Once Too Often," supplied through the courtesy of the U. S. Air Force, Kelly Field, Tex., was shown. A casting problem clinic was held and two problems presented, one in aluminum and one in steel. Defective castings were shown and discussed as to probable causes and remedies.

Officers elected for 1954-55 are Robert Hoffman, Texalloy Foundry Co., chairman, Walter Reynes, Kincaid-Osburn Electric Steel Co., co-chairman, and George H. Hartwell, Alamo Iron Works, secretary-treasurer.—*George H. Hartwell, Alamo Iron Works.*

Central Michigan

CENTRAL Michigan Chapter of the AFS held its kickoff meeting Sept. 15 at Jackson Country Club, Jackson, Mich., with Lachlan Currie, Gale Mfg. Co., chapter chairman, presiding. Collins Carter, Albion Malleable Iron Co., immediate past national president of the AFS, reviewed the highlights of the national organization during the past year.

Hans Heine, technical director, AFS, was the main speaker. He stated that if industry is to progress, its future leaders must be trained to think and be willing to experiment, try new methods and products. Mr. Heine urged our educators to teach students the values of a broad knowl-

(*Continued on page* 195)

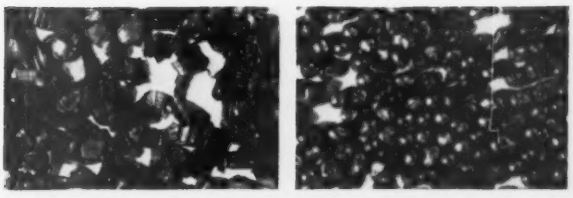
CUT STEEL

GIVES OUR CASTINGS A GLEAMING, NATURAL METALLIC FINISH—A BETTER FINISH THAN WE'VE EVER HAD BEFORE"

The above statement was included in a letter received from a well-known, midwest, production foundry, one of the first users of Metal Blast's new CUT STEEL abrasive. The letter went on to say that CUT STEEL cleans as much as ***twice as fast*** as abrasives previously used in this foundry!

CUT STEEL is entirely different than any other abrasive, in appearance and in performance. Composed of small particles cut from high grade alloy steel — it actually work-hardens in use — cleans better and lasts longer than any other abrasive. ***Yet, Grade "A" CUT STEEL costs less than most cast steel shot — Grade "B" no more than malleable shot!***

If you'd like to get a better finish than you've ever had before, faster and more economically — then be sure to try CUT STEEL. Send for samples, literature or a trial order — TODAY!



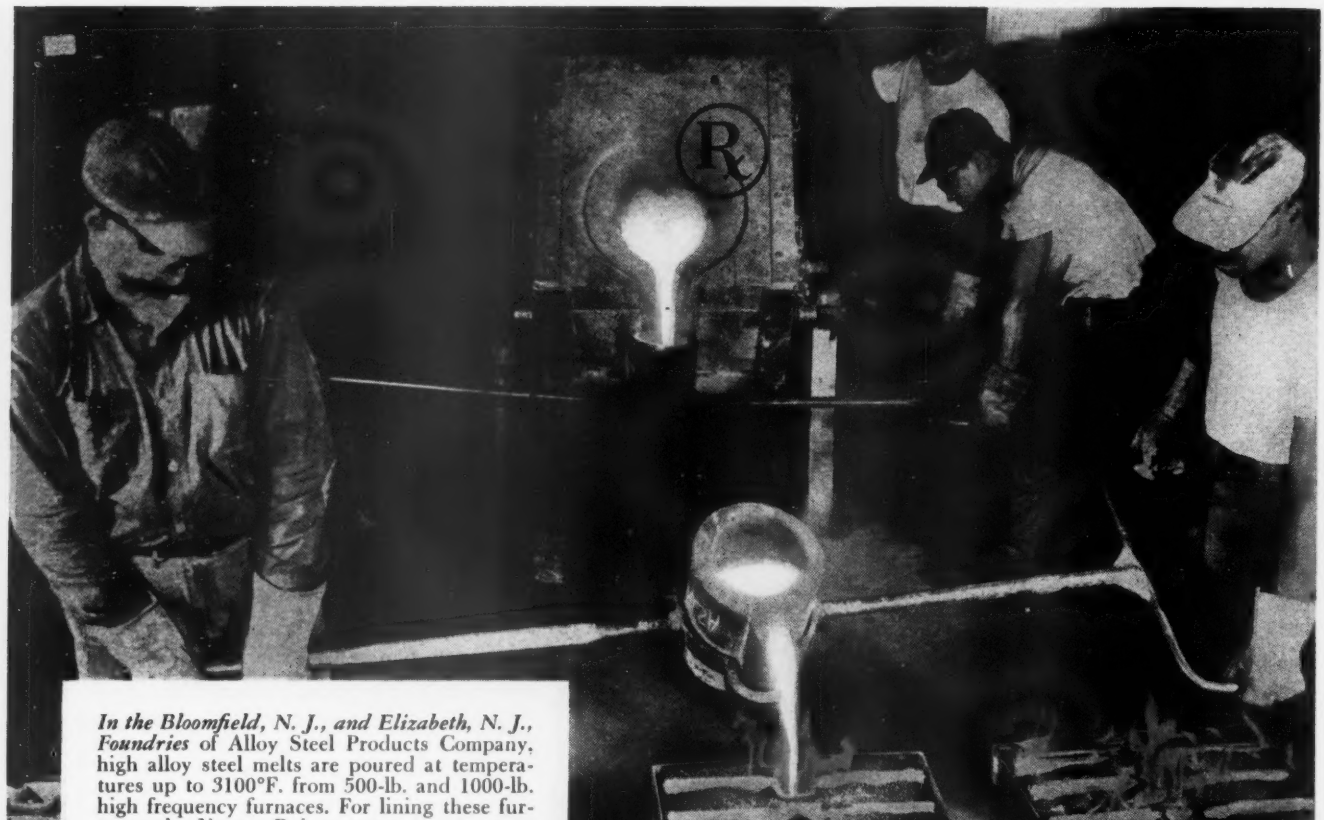
CUT STEEL changes shape in usage. Its original form is grit-like, with sharp edges and corners. But in production, it rapidly changes to a spherical shape, in a variety of sizes. The smaller pellets contribute to its efficiency by penetrating to even the hardest-to-reach parts of castings.

SOONER
OR LATER,
YOU TOO, WILL
CHANGE TO
CUT STEEL

METAL BLAST, Inc.
872 EAST 67th ST., CLEVELAND 3, OHIO
manufacturers of ANNEALSHOT, SUPER-ANNEALSHOT, CUT STEEL ABRASIVES

Another Norton Rx *on the job!*

*Makers of famous Aloyco Valves, after testing many cements, standardize on MAGNORITE**



In the Bloomfield, N. J., and Elizabeth, N. J., Foundries of Alloy Steel Products Company, high alloy steel melts are poured at temperatures up to 3100°F. from 500-lb. and 1000-lb. high frequency furnaces. For lining these furnaces the Norton Rx is MAGNORITE cement — used for mudding-up the coil, for the dry-rammed crucible lining and also for capping the crucible and forming the pouring spout.

Over the years the Alloy Steel Products Company, world's largest specialists in high alloy, corrosion resisting valves, have tested many refractory materials for the linings of their high frequency induction furnaces.

These tests proved that Norton MAGNORITE cement, engineered-to-the-job, lasted longer and performed better than any other material. As a result, Aloyco now uses MAGNORITE cement exclusively for lining these furnaces — still another example of how Norton refractories and refractory materials are *engineered and prescribed* to provide time-and-money-saving Rx's.

The Right Rx For YOU

For your own induction furnace operations, Norton will be glad to engineer MAGNORITE cement to your exact requirements. It withstands temperatures up to 3250°F. Its high-rammed density offers great resistance to metal penetration, erosion and chemical attack. And it is designed to expand slightly when sintered so that the crucible lining is free from shrinkage cracks that often lead to furnace failures. Why not run a test on one of your furnaces soon?

This engineering service applies, of course, to any metal-melting problem you may have. Working with MAGNORITE*, ALUNDUM*, CRYSTOLON* and fused stabilized zirconia cements and special shapes, Norton engineers are sure to come up with the right answers. For details, see your Norton Refractories Engineer, or write to NORTON COMPANY, Refractories Division, 310 New Bond St., Worcester 6, Mass. *Canadian Representative:* A. P. Green Fire Brick Co., Ltd., Toronto, Ontario.

NORTON

REFRACTORIES

Engineered... Rx... Prescribed

Making better products... to make other products better

*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries

(*Continued from page* 192)
edge of many subjects and not let them be content with specialization in one trade or skill. Meeting closed with showing of a new sound movie of operations and progress at Albion Malleable Iron Co.—*Louis Heisler, Gale Mfg. Co.*

Eastern New York

MORE than 50 members and guests of the Eastern New York Chapter of the AFS gathered at Panetta's Restaurant, Menands, N. Y., in September to attend the first meeting

EASTERN NEW YORK Chapter of the AFS met recently at Menands, N. Y. to hear a talk on the "D-Process of Shell Molding" by Warner Bishop, Archer-Daniels-Midland Co. W. C. Stephenson, Rensselaer Valve Co., chapter chairman, above left, is shown at the speaker's stand with Mr. Bishop. Photo by Howard Bodwell, General Electric Co.

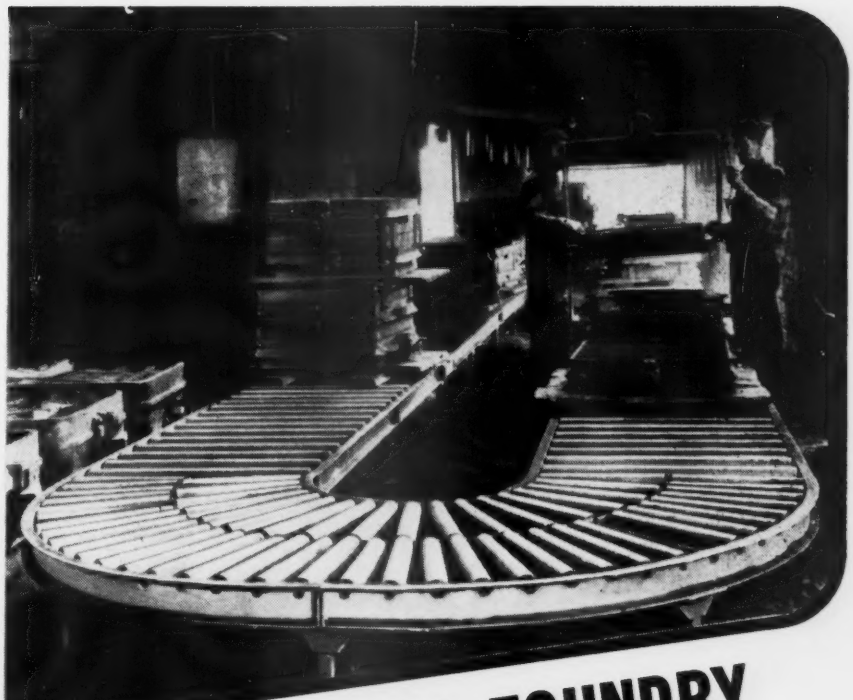
of the new season. New officers and directors were introduced.

Guest speaker was Warner Bishop, Archer-Daniels-Midland Co., who discussed the "D-Process for Shell Molding." He described the process of blowing a mixture of fine dry sand and an oleo-resinous binder through a pattern mounted on the head of a core blowing machine into a contoured dryer. Shell is baked in a conventional core oven for about one-half hour at 425-500°F. Fly ash was mentioned as an excellent release agent. Advantages given included better finishes and closer tolerances than green sand, high green strength, and low cost of the binder.—*L. J. DiNuzzo, General Electric Co.*

St. Louis

ST. LOUIS Chapter of the AFS opened its 1954-55 season on Sept. 9 with an announcement of a Missouri Valley Regional Foundry

(*Continued on page* 198)



HOW AN OHIO FOUNDRY INCREASED PRODUCTION IN SAME FLOOR AREA

Faced with a production bottle-neck because of a lack of operating space, Chris Erhart Foundry and Machine Co., 1237 W. 6th St., Cincinnati easily solved its problem by the installation of an Alvey-Ferguson *Engineered* Conveying System.

Now, molds are poured right on the A-F "complete oval" gravity roller system which is also used as a live storage bank for as many as 40 molds at a time. This, plus the installation of molding machines, has boosted production facilities to the satisfaction of all Erhart officials . . . and because molds no longer have to be carted, employees are happier too.

A-F Engineers can help *you* save money in handling flasks, molds and castings. Write without obligation — for a discussion of latest efficient methods — today.

THE ALVEY-FERGUSON CO.

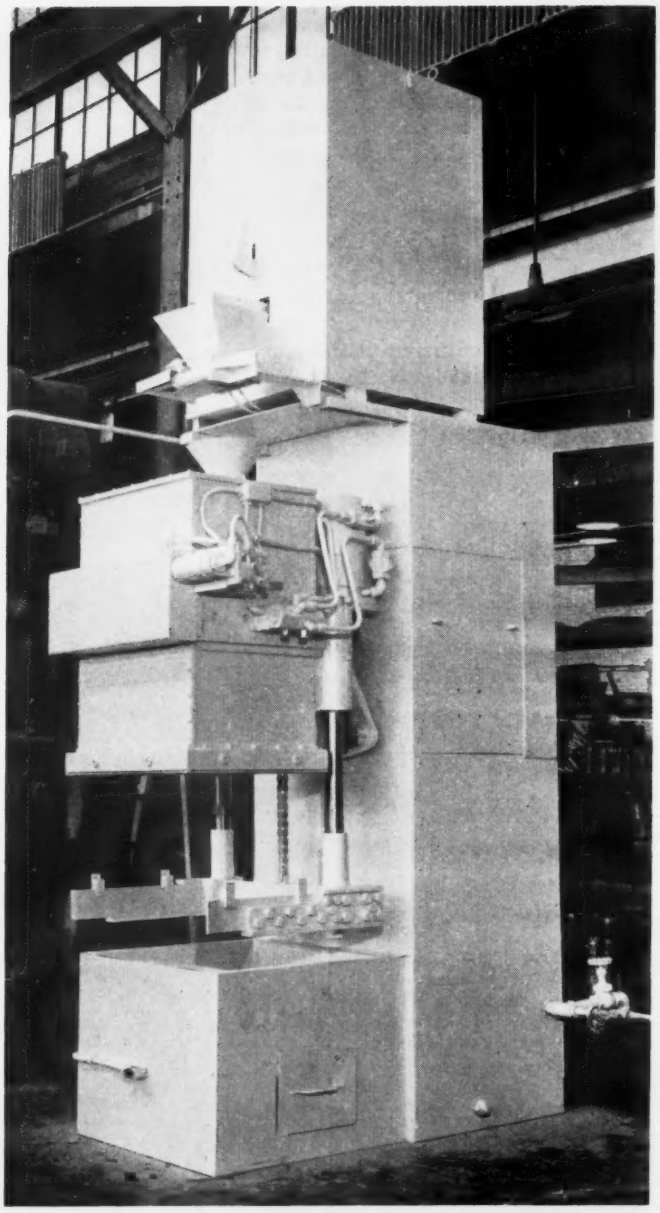
WEST COAST PLANT
760 N. Georgia St.
Azusa, California

OF CINCINNATI
106 Disney Street — CINCINNATI 9, OHIO
Offices or Representatives in Principal Cities

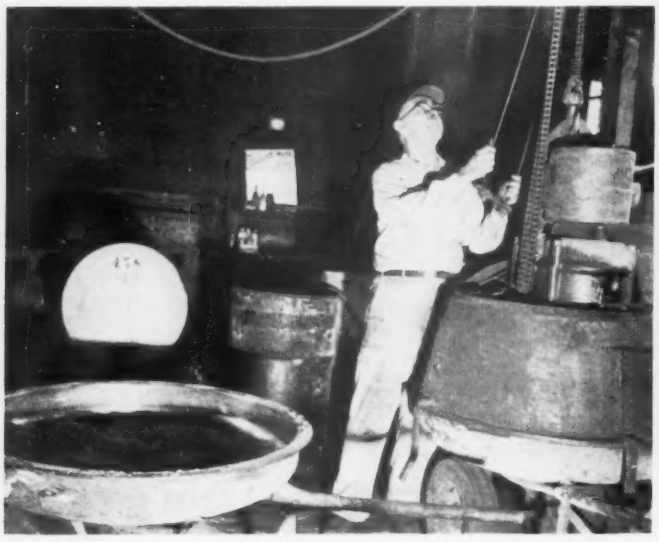
Since 1901 — FIRST IN ENGINEERED CONVEYING SYSTEMS

(Advertisement)

New equipment that pays for itself through reduced costs

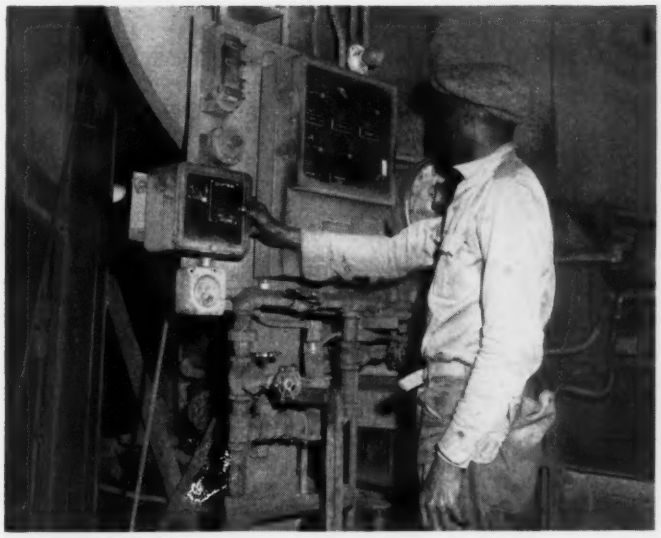


THIS FULLY AUTOMATIC SHELL INVESTMENT UNIT forms four or more perfect shells for patterns up to 24 x 30 inches in size each minute. It features precise investment time control, metered sand resin addition, controlled sand resin rainfall and thorough lamp scavenging. This shell investor may be installed individually and later combined in a complete rotary Formatic Unit. When installed individually and used with pattern dollies, it offers all of the control features so essential to shell molding. *Full information may be obtained by writing to Beardsley & Piper, 2424 N. Cicero, Chicago 39, Ill.*

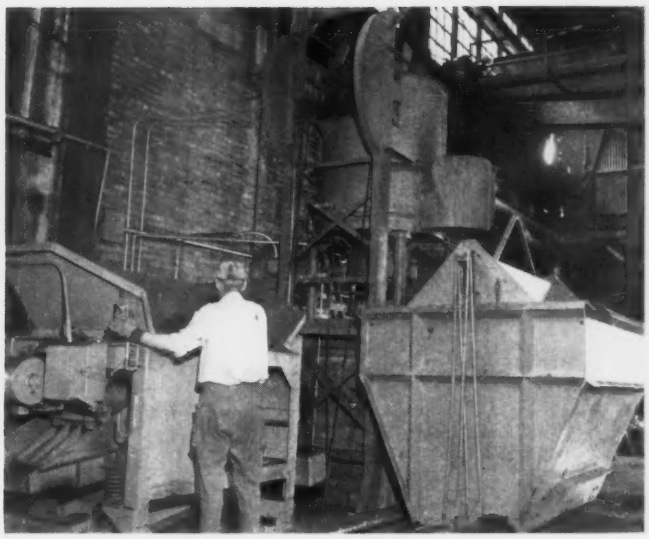


ALL OF THIS FOUNDRY'S CORE SAND is prepared in this Model 3½ Mulbaro. At the Riverside Foundry, Chicago, Illinois, three barrows are used with a single mulling mechanism permitting full utilization of the Mulbaro's capacity. *For full information write to Beardsley & Piper, 2424 N. Cicero, Chicago 39, Ill.*

IN ONE OF THE BEST small core rooms in the country . . . the Midwest Foundry at Coldwater, Michigan, blows a great variety of miscellaneous cores on B&P Champion Core Blowers. A powered conveyor belt handles the output from eight Champion Blowers. *For full data write to Beardsley & Piper, 2424 N. Cicero, Chicago 39, Ill.*

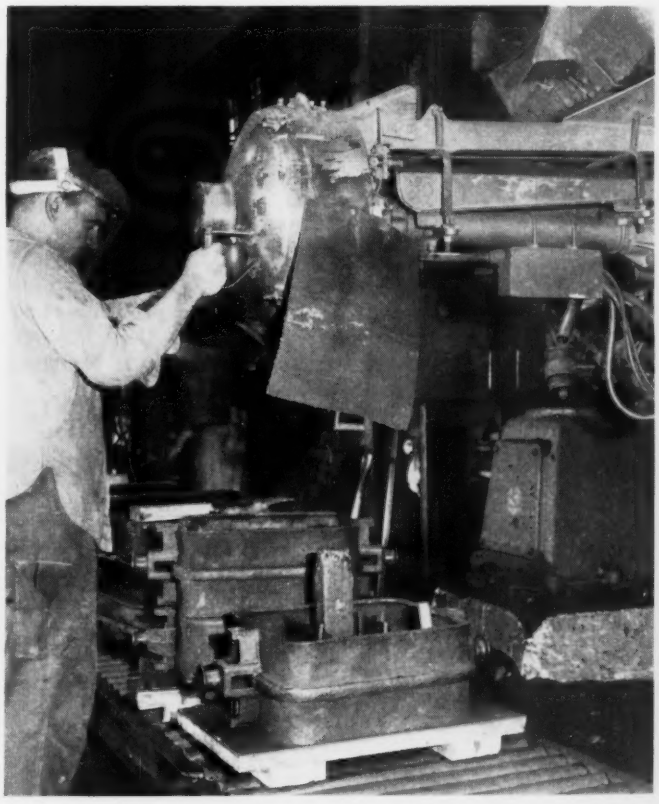


SKIPTROL CUTS COSTS in this gray iron foundry where two Skiptrol-equipped Speedmullor-Preparator units handle the preparation of molding sand. Skiptrol automatically controls the loading of the skiphoist bucket and stops the Preparator or loading belt when the bucket is full. *Full data may be obtained by writing to Beardsley & Piper, 2424 N. Cicero, Chicago 39, Ill.*



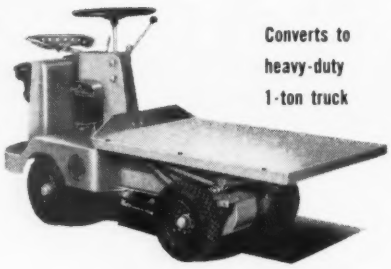
NO PITS were required for the installation of the new Model "60" Preparator which is a part of this "50-60" Speedmullor-Preparator unit at the Riverside Foundry, Chicago, Illinois. The "50" Speedmullor is platform-mounted to permit loading of the portable slinger tank at floor level. *Send for a free copy of the Riverside story; Beardsley & Piper, 2424 N. Cicero, Chicago 39, Ill.*

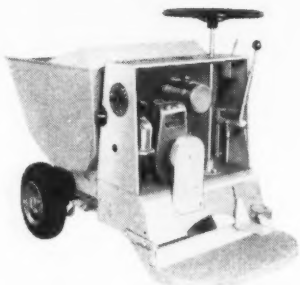
PERFECTLY RIDDLED CORE SAND is riddled directly onto the pattern by this B&P Roller Riddle at the Chemalloy Foundry, Louisiana, Missouri. The automatic Roller Riddle need only be positioned over the core box momentarily and the riddling job is completed. The core box is mounted on a J&J Jolt-Rol-A-Draw and the sand is Speedmullor-mulled. *Full data may be obtained by writing to Beardsley & Piper, 2424 N. Cicero, Chicago 39, Ill.*



THIS SANDSLINGER-CONVEYOR UNIT at the Lindgren Foundry, Batavia, Illinois, successfully handles the foundry's small and medium size work. With Slinger flexibility loose or mounted patterns of any height and of wood or metal construction may be handled with ease. A newly installed Speedmullor provides the mulled all-purpose sand for this operation. *Write for full information to Beardsley & Piper, 2424 N. Cicero, Chicago 39, Ill.*

- Has 2,000-pound load capacity.
- 15 cu. ft. gravity-dump hopper with snub-line control.
- Interchangeable 34" x 54" platform with side-board stake pockets.
- 8.3 h.p. gas engine (electric starter, muffler optional).
- 6 m.p.h. speed forward and reverse; automotive type brakes.
- Adjustable seat, easy-reach clutch lever, brake pedal.
- Automotive steering with 12-to-1 gear reduction ratio.
- Turning radius only 73 inches; overall width 35 inches.
- All-welded chassis; coil-spring-mounted steering axle.
- Dual pneumatic drive tires (or soft-core solid rubber) optional.





Also check smaller, 6 h.p. Moto-Bug. Has 10 cu. ft. hopper capacity . . . hauls ¾ ton on platform . . . lifts ½ ton with fork lift attachment. See your Kwik-Mix distributor or write us.

Want more facts?

mail to: KWIK-MIX COMPANY 3029 W. Concordia, Milwaukee 16, Wis. (Koehring Subsidiary)

Send us details on new Moto-Bug with: ☐ 15 cu. ft. hopper ☐ 2000-lb. platform

NAME..... TITLE.....

COMPANY.....

STREET.....

CITY..... STATE.....

☐ Also send literature on 10 cu. ft. Moto-Bug.®

KM448 FO

(*Continued from page* 195)

Conference scheduled for October, 1955 at Missouri School of Mines, Rolla, Mo. Conference will be sponsored jointly by the St. Louis, Tri-State and Mo-Kan chapters of the AFS, and the Missouri School of Mines student chapter. Webb L. Kammerer, Midvale Mining & Mfg. Co., will serve as chairman.

ST. LOUIS Chapter of the AFS met Sept. 6 and heard Tom C. Muff (above), installation engineer, Sorbo-Mat Process Engineers, discuss "Some Phases of Foundry Control." Photograph is through the courtesy of Jack R. Bodine Jr., Bodine Pattern & Foundry Co.

Norman Piekert, Carondelet Foundry Co., technical chairman, introduced Tom C. Muff, installation engineer, Sorbo-Mat Process Engineers, who spoke on "Some Phases of Foundry Control." Mr. Muff discussed the classification of casting defects due to sand conditions, cupola design and recent improvements over conventional designing, coke problems, and acid slag calculations.—*Jack R. Bodine Jr., Bodine Pattern & Foundry Co.*

Central New York

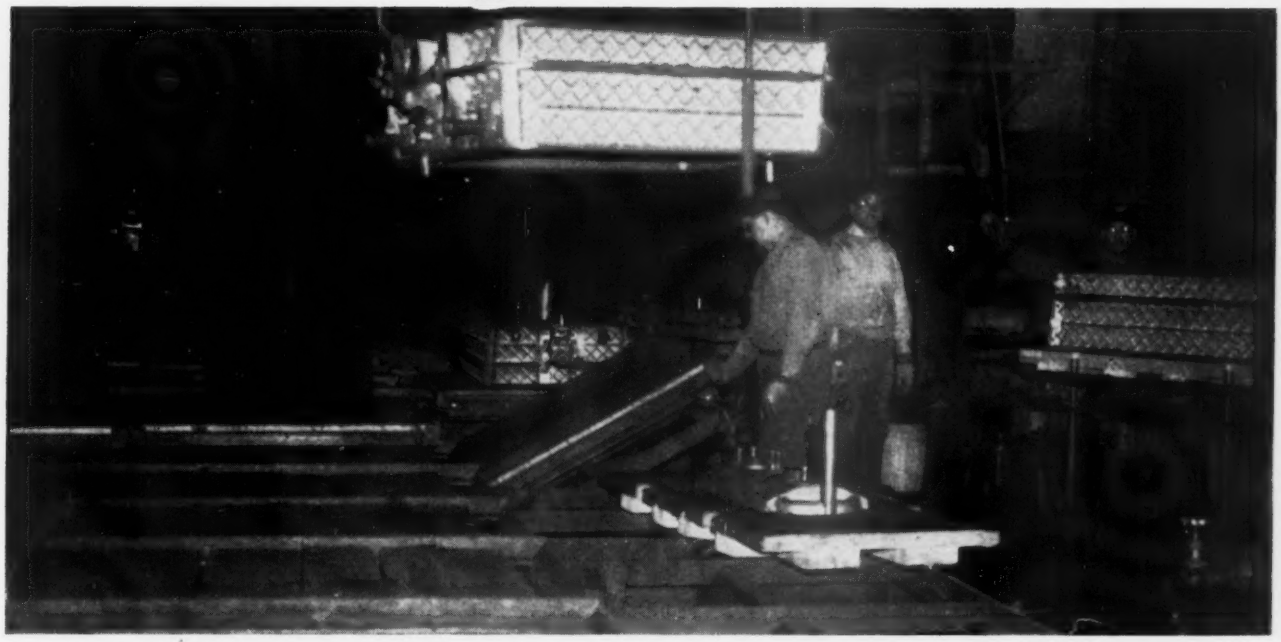
THE 1954-55 kickoff meeting of the Central New York Chapter of the AFS was held Sept. 10 at Trinkaus Manor, Oriskany, N. Y., with 99 members attending. James Ochsner, Crouse-Hinds Co., chapter vice chairman, introduced the speaker, Howard H. Wilder, manager, Iron Foundry Division, Vanadium Corp. of America, who spoke on "Modern Cupola Operation."

The speaker discussed all phases of cupola operation and referred to the cupola as an inexpensive and comparatively simple piece of equipment to purchase, install and operate; and yet it is perhaps the most talked about, written about, and the most

(*Concluded on page* 200)

TOP MANAGEMENT DECIDES THEY WANT

NOMAD CONVEYOR SYSTEMS★



. . . *wherever they have a conveying problem . . . . .*

Here's an installation that shows how the rugged construction of Nomad Conveyor Systems insures heavy load capacity, day after day.

In the foreground of the picture and immediately over the decking can be seen the top surface of a mold pallet being returned to the molding area. Beyond this, note the worker bringing another pallet into working position with the aid of a hydraulic mechanism. Notice too, the cope suspended by crane and ready for the drag next in line. Pattern equipment conveniently placed on the conveyor line in the foreground awaits transfer to the molding machine shown at the extreme right. Another feature of this equipment which is not visible in the picture is the pallet return underneath the pouring deck. Both removable and tight flasks can be used in conjunction with this equipment.

Whether you are producing small or large molds there's a Nomad Conveyor designed to meet your needs. Nomad foundry engineers will assist you in deciding which type fits your specific needs.

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WESTOVER ENGINEERS
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Write today for full information

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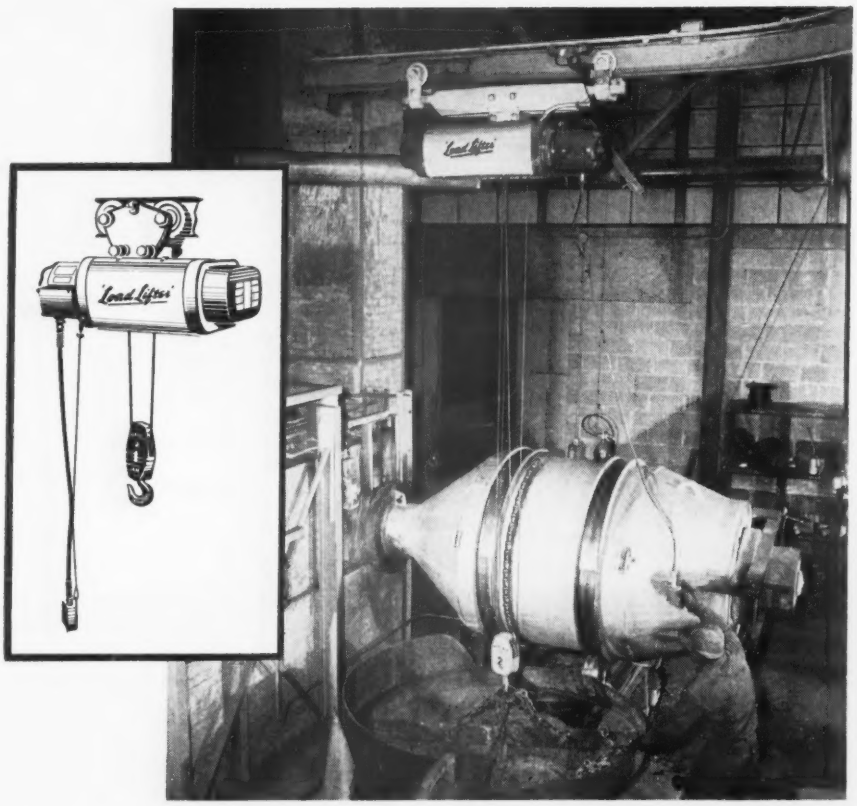


SAVES ON LOW ... SAVES ON HIGH

it's the TWO-SPEED 'Load Lifter'®

The two-speed "Series 700" 'Load Lifter' Electric Hoist gives foundrymen the right speed at the right time — at the push of a button. There's a fast high that lifts a 1-ton load half a foot a second. There's a slow creeping speed for setting cores; drawing patterns; and closing flasks easily, smoothly, carefully.

Foundrymen also favor the two-speed 'Load-Lifter' for other money-saving reasons. It is ruggedly built for heavy-duty service. The helical gears are heat-treated for extra strength. Ball bearings throughout minimize frictional wear. Steel suspension, powerful synchronized load and motor brakes, non-fracturing hook and only 24 volts at the push button contribute substantially to the complete protection of man, load and hoist. One-hand control makes spotting easier, more accurate.

On every count, the two-speed 'Load Lifter' is the best electric hoist investment you can make. Capacities range from ½ ton up. Your local "Shaw-Box" Distributor will gladly give you all the facts — or write for Buletin 399.

'Load Lifter'® ELECTRIC HOISTS

MANNING, MAXWELL & MOORE, INC.
MUSKEGON, MICHIGAN

Builders of "Shaw-Box" and 'Load Lifter' Cranes, 'Budgit' and 'Load Lifter' Hoists and other lifting specialties. Makers of 'Ashcroft' Gauges, 'Hancock' Valves, 'Consolidated' Safety and Relief Valves, 'American' and 'American-Microsen' Industrial Instruments, and Aircraft Products.

(*Concluded from page* 198)

misunderstood operation in the foundry industry. He stated that many operators, metallurgists and managers still feel a cupola can be turned on and off like a water faucet and still produce quality products. He stressed that accurate control and attention to proper maintenance and operation of the cupola, as well as the materials melted, are necessary to obtain the product desired. To do this, the operations of the melting department should be placed in the hands of one responsible individual. — *Bruce R. Artz, Pangborn Corp.*

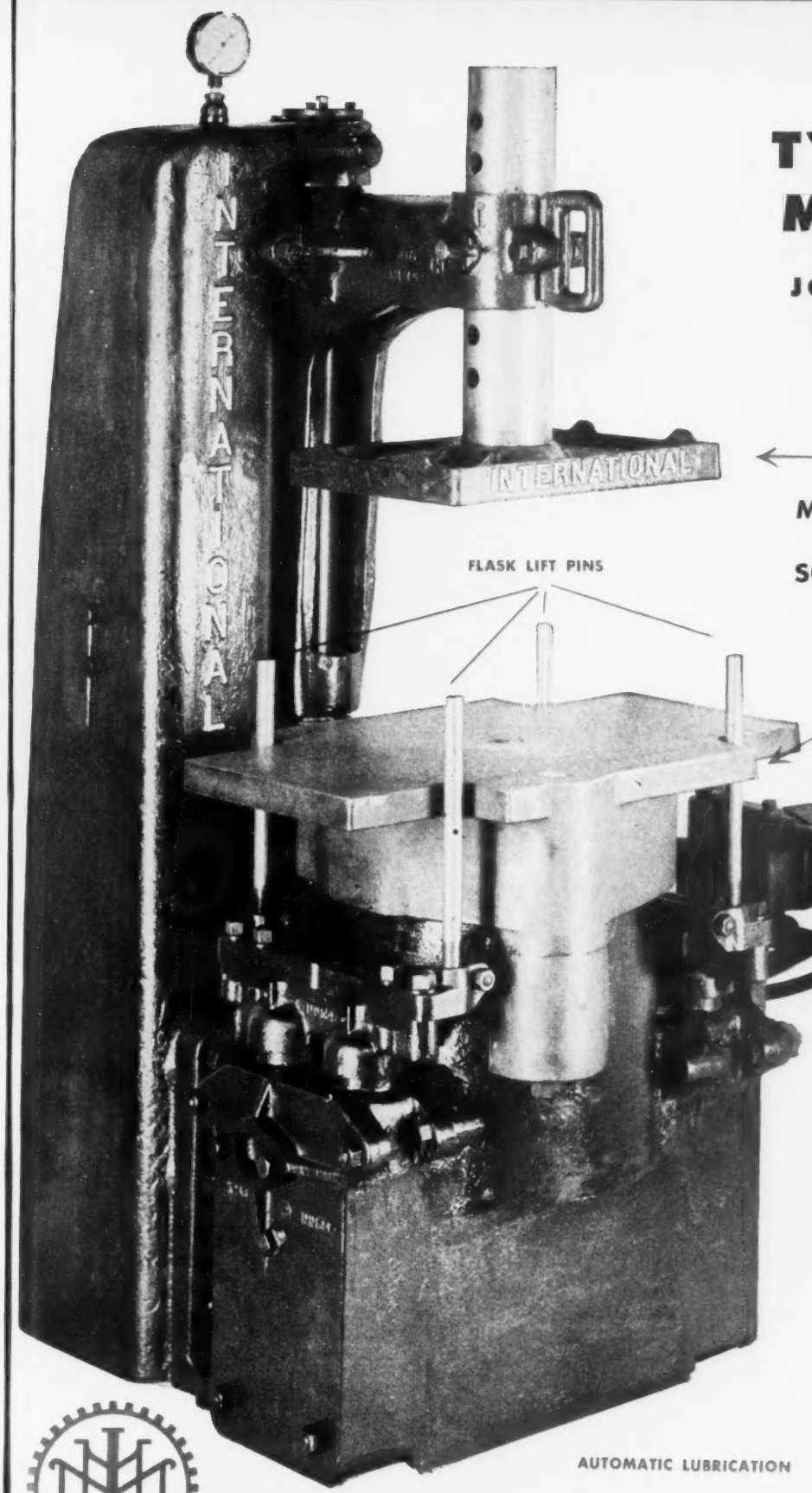
NORTHEASTERN OHIO Chapter of the AFS met Sept. 9 at the Tudor Arms Hotel, Cleveland, to hear a talk, "Modernization of the Foundry," by Lester B. Knight, president, Lester B. Knight & Associates, Chicago (above). Nearly 200 guests and members attended. Photograph by the courtesy of Harold Wheeler, Superior Foundry Inc.

Ontario

A DISCUSSION of "Plastics in Patternmaking" was the subject of W. C. Dunn, Western Pattern Works, Montreal, at the Sept. 24 meeting of the Ontario Chapter of the AFS held at the Royal Connaught Hotel, Hamilton, Ont.

Mr. Dunn pointed out many advantages claimed for phenolic plastic patterns. They are light in weight, will not change shape or dimensions under unfavorable conditions, will withstand severe foundry use and last indefinitely. Master wood patterns can be duplicated perfectly as there is no shrinkage. Any number of duplicate models can be made from a single wood master. Plastic corebox es are lighter than metal coreboxes and require little or no rapping to draw. Used on blowers, they are more resistant to abrasion than metal.— *L. Humphreys and D. Magder.*

INTERNATIONAL



TYPE PKL MACHINE

JOLT, SQUEEZE, AIR PIN LIFT

Made with 12" and 14" Diameter SQUEEZE CYLINDER

Built Right- Priced Right!

"There is an INTERNATIONAL for every job"

Internationals are designed and built by experienced Foundry Engineers who have a practical knowledge of the problems of the foundry business.

INTERNATIONAL MOLDING MACHINE COMPANY

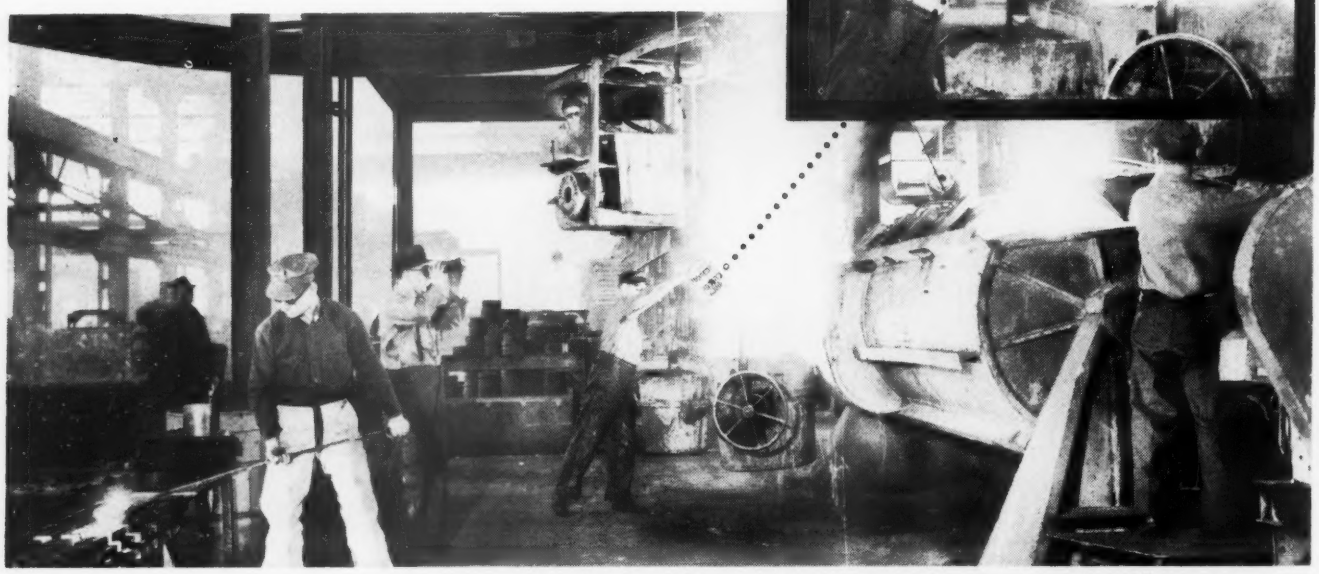
LA GRANGE PARK, ILLINOIS

Caterpillar® Uses Molybdenum

Caterpillar D8 tractor working on a stubborn highway construction job.

A close-up view of alloying Molybdenum additions entering the molten metal.

PLANNED STRENGTH



A section of a Caterpillar foundry in operation, showing pouring chill test, temperature reading by optical pyrometer, alloy additions and taking a test of molten iron.

Acknowledged the world's largest earth-moving equipment manufacturer, Caterpillar Tractor Co. has long recognized the importance of MCA Molybdenum additions for strength and safety in castings for pistons, piston rings, crank shafts and cylinder heads.

In this 50th Anniversary Year of Caterpillar Tractor Co.'s manufacture of track-type tractors, it is significant that tough, slugging, punishing usage of equipment in the field is fully anticipated. To meet the rugged requirements of castings to stand up under the toughest duty, and come back for more, their destiny is shaped in the foundry where relatively small additions of MCA Molybdenum improve deep hardenability, eliminate temper brittleness, improve machineability, and upgrade other physical and metallurgical properties.

MCA Molybdenum has become the standard of comparison and the leader in its field, through constant technical research and application in the metallurgical industry.

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MCA

Standard Specification for

Silicon-bronze and Silicon-brass Sand Castings

ASTM Designation: B198—52

Adopted, 1948: Revised, 1949, 1952

Scope

1. This specification covers castings of three alloys having ASTM classifications, alloy numbers and commercial designations, and compositions shown in Table I.

Basis of Purchase

2. Orders for material under this specification shall include the following information:

(1) Alloy number (Section 1),

(2) Statement of desired or restricted composition (Section 3),

(3) Tests or certification required (Tables I and II, and Sections 4, 7, 11),

(4) Place of inspection (Section 10).

Chemical Composition

3. The castings shall conform to the requirements as to chemical composition prescribed in Table I, except as may be otherwise agreed upon by the manufacturer and purchaser. If a restricted composition is prescribed, it should be arranged by mutual agreement between the manufacturer and the purchaser. Permissible variation or range within a restricted composition shall be as follows:

	Permissible variations plus and minus, per cent
Silicon	0.4
Zinc	1.5
Other elements prescribed	0.3

Chemical Analysis

(4) (a) When charge makeup and type of furnace are the same, heats (or pours from individual heats or furnaces) may be grouped. One chemical analysis shall be made from an individual heat to represent each 4-hr. pouring period or fraction thereof, or representing not more than 2000 lb of rough castings, if a 4-hr period covers the production of over 2000 lb of rough castings.

Table I—Chemical Requirements

Classification	Silicon Bronze		Silicon Brass			
Alloy Number	12 A		13 A		13 B	
	Min.	Max.	Min.	Max.	Min.	Max.
Copper, plus named elements, per cent	99.5	...	99.5	....	99.5	....
Tin, per cent	....	1.0	....	....	....	....
Lead, per cent	....	0.5	....	1.0	....	0.5
Zinc, per cent	....	5.0	12.0	16.0	12.0	16.0
Iron, per cent	....	2.5	....	....	....	....
Aluminum, per cent	....	1.5	....	....	....	....
Silicon, per cent	1.0	5.0	2.5	4.0	3.0	5.0
Manganese, per cent	....	1.5	....	....	....	....

Note: All elements named in this table are normal constituents of the range of alloys contemplated in this specification, and analysis shall be made regularly for all of them.

(b) The purchaser may, at his option and his own expense, make a check analysis of each melt.

(c) The sample for chemical analysis shall be taken by drilling or cutting the test coupon or sprue in such a manner as to be representative of the entire cross section.

Tensile Properties

5. The material shall conform to the requirements as to tensile properties prescribed in Table II.

Test Specimens

6. (a) It is recommended that the test coupons and specimens for tension tests be prepared in accordance with the Recommended Practice for Tension Test Specimens for Copper-Base Alloys for Sand Castings (ASTM Designation B 208).

(b) Test specimens may be chilled provided the castings also are chilled in the same manner.

(c) Cast to size specimens, pulled as cast or machined are recognized under this specification.

(d) Unmachined specimens shall be cast to size 0.505 plus or minus 0.03-in. in diameter in pulling section. Stress shall be calculated in pounds per square inch according to the accurately measured cross section of the specimen. The parallel pulling section of the specimen shall be not less than 2¼ in. and the shoulder to shoulder dimensions not more than 2¾ in.

Table II—Tensile Requirements

Classification	Silicon Bronze	Silicon Brass	
Alloy Number	12 A	13 A	13 B
Tensile strength, minimum, psi	45,000	50,000	60,000
Yield strength[a], minimum, psi	18,000	21,000	24,000
Elongation in 2 in., minimum per cent	20	18	16

[a] The yield strength in tension shall be determined as the stress producing an elongation under load of 0.5 per cent, that is, 0.01-in. in a gage length of 2 in.

Number of Tests

7. (a) When charge makeup and type of furnace are the same, heats (or pours from individual heats or furnaces) may be grouped. One test bar shall be made from an individual heat to represent each 4-hr pouring period or fraction thereof, or representing not more than 2000 lb of rough castings, if a 4 hr period covers the production of over 2000 lb of rough castings.

(b) The purchaser shall specify whether or not his inspector shall witness the pouring of test molds.

(c) If any test specimen shows defective machining or reveals casting defects, it may be discarded and replaced by another specimen selected by the inspector.

LA GRANGE PARK, ILLINOIS

FOUNDRY Data Sheet

Significance of Numerical Limits

8. For purposes of determining compliance with the specified limits for requirements of the properties listed in the following table, an observed value or calculated value, shall be rounded off as indicated in accordance with the rounding-off method of the Recommended Practices for Designating Significant Places in Specified Limiting Values (ASTM Designation: E 29):

Property	Rounded-off unit for Observed or Calculated Value
Chemical Composition	Nearest unit in the last right-hand place of figures
Tensile Strength } Yield Strength }	Nearest 1000 psi
Elongation	
5 per cent and over	Nearest 1 per cent

Workmanship and Finish

9. (a) The castings shall be free from blowholes, porosity, hard spots, shrinkage defects or cracks, or other injurious defects, and shall be smooth and well cleaned, before inspection, by sand blasting, tumbling, chipping, or other process approved by the inspector.

(b) The castings shall not be repaired, plugged, welded, or "burned in", unless permission from the inspector has been previously secured. This permission will be given only when the defects are such that after the approved repair the usefulness and strength of the castings has not been impaired. Each such repair shall be true to pattern, free from swells, etc. Wall thickness shall be uniform throughout the lot of castings and all cores shall be accurately set.

(d) Where thick and thin sections join, the manufacturer shall be permitted to add (where not previously provided) fillets of proper size to avoid cracking upon cooling, subject to approval of the inspector.

Inspection

10. (a) Inspection shall be made at the manufacturer's works, unless otherwise agreed upon.

(b) When inspection is made at the manufacturer's works, the inspector representing the purchaser shall have free entry, at all times while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works that concern the manufacture of the material ordered. The manufacturer shall afford the inspector without charge, all reasonable facilities to satisfy him that the material is being furnished in accordance with this specification. All tests and inspection shall be so conducted as not to interfere unnecessarily with the operation of the works.

Certification

11. In the case of a product manufactured in advance, or when so specified in the contract or purchase order, or by mutual agreement between the manufacturer and the purchaser, the material (and castings it represents) may be certified as conforming to this specification subject to the following procedure: Not less than two tension tests, from different heats, and not less than one chemical analysis shall be made by the manufacturer from each day's melt. Records of the tension test results and chemical analysis shall be systematically made and maintained and shall be the basis for certification and upon written request by the purchaser, these records may be examined by the purchaser or his accredited representatives upon the manufacturer's premises.

Rejection

12. Castings that show injurious defects revealed by machining operations subsequent to acceptance may be rejected, and if rejected, the foundry shall be notified within 30 days. The full weight of the original material rejected shall be returned to the foundry. The foundry shall not be responsible for the costs of machining defective castings.

Appendix

A1. The compositions shown in Table I are intended to provide a series of substitutes for tin and tin-zinc bronzes, as well as for employment for and on their own merits.

A2. Applications of these metals may be classified as follows:

(1) Structural:
Strength, toughness, ductility, hardness, that is, resistance to mechanical stresses and loads (Paragraph A3).

(2) Special Uses:
(a) At elevated temperatures (Paragraph A4).
(b) Under highly corrosive conditions (Paragraph A5).
(c) Pressure resistance.

A3. In purely structural usages the silicon-bronze and silicon-brass alloys shown in Table I are, in general, stronger and have higher quasi-elastic range than the tin bronzes they are intended to replace. In case of alloys 13A and 13B a considerably higher quasi-elastic range (as indicated by yield strengths) is available.

A4. Resistance to effects of temperature of all alloys covered in this specification is not fully known. While some have been used successfully within ranges wherein usage of tin bronzes is permitted and prescribed, it should be recognized that within the series of Table I there are alloys beyond alpha solid solution range. Possibility of loss of ductility (by precipitation or age hardening under elevated temperature usage) should be avoided by getting data on each specific composition contemplated. (This is equally true of usage of tin bronzes.)

A5. In common with other copper-base alloys, the classifications shown in Table I possess various degrees of corrosion resistance. They do not rust. Alloys containing iron are slightly magnetic, others are not, and the specific alloy contemplated should be practically iron free if absence of magnetic properties is a consideration. In the absence of established data their behavior under severely corrosive conditions should be established by tests under the specific conditions to be encountered. Each specific composition should be tested when dezincification and corrosion cracking are factors.

A6. Like corrosion, wear is a generic problem. Some of the compositions prescribed in Table I have proved to have good wear resistance, even under conditions of non-lubrication. In general, varying degrees of success have been attained, according to both alloy and service, and caution and experiment are advised.

A7. These alloys have somewhat different foundry and machining characteristics than the better known tin bronzes. In general their liquid shrinkage is somewhat greater than the tin bronzes, but much less than that of the manganese bronzes. In some cases their pouring temperatures are considerably lower than those customary for tin bronzes. Use of zinc usually improves machinability. Use of lead greatly facilitates machinability, particularly for tapping and die operations, and if properly incorporated in the lower silicon containing alloys causes little or no deterioration in strength or ductility. They lend themselves more readily to welding, brazing and soldering and "burning in" than the tin bronzes.

A8. In order to promote safe and sound engineering applications experiment and study are encouraged before selections are made. Careful metallurgical study will reveal marked advantages of these alloys in some respects, but tests on adaptability should be made wherever the service is critical. There is no precise substitute for any alloy.

Additional copies of this specification may be obtained from the American Society for Testing Materials, 1916 Race St., Philadelphia 3, for a nominal sum.

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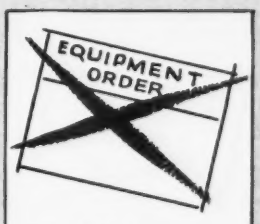

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AROUND THE COUNTRY

Philadelphia . . .

MALLEABLE foundries appear to be experiencing relatively the best operations in this district. Trade estimates place malleable production at around 80 per cent of normal, against 75 per cent for gray iron and steel and 60 per cent for nonferrous.

While ferrous foundry rates have improved slightly the last few weeks, nonferrous shops seem to be making no headway. In fact, aluminum and magnesium foundries, the more active of this group, appear less busy. Shops engaged in aircraft work are working five days a week, but backlogs are shrinking.

Malleable production is bolstered by demand for electrical and pipe fittings. Backlogs are holding up well, averaging around two months. Railroad specifications are scant.

Most gray iron foundries are on a five-day week but with limited working forces. Possibly 20 per cent are doing no better than four days a week. Pipe shops are busy, but iron foundries generally have little work ahead, most offering delivery within two weeks. Textile machinery requirements are lagging.

Steel foundries are depending largely on miscellaneous demand, although requirements for chemical and power installations, material handling equipment and gear work appear outstanding. Backlogs extend to about six weeks.

Los Angeles . . .

WITH the summer letdown over, foundrymen in this district expect the fourth quarter to be better than any three-month period this year. October sales were 10 per cent better than a good September for most melters, and inquiries are rising.

While some trade experts attribute the surge of foundry sales to reduced inventories held by castings consumers, some foundrymen feel the end of summer shutdowns for vacations and mid-summer inventories is the key factor. Most foundrymen noted an apparent upswing in business as early as May, and feel the summer slump merely slowed down the trend. With fall months at hand, the trend has again asserted itself, both in sales and inquiries. Most shops report they turn 25 per cent of inquiries into sales.

Foundry melting rates average 90 per cent in most steel shops, slightly lower for the nonferrous foundries. Five-day weeks are now standard throughout the district, with some overtime reported, but few work weeks are less than 40 hours.

Backlogs are beginning to string out again. Foundries reporting three-week backlogs in July now are hard pressed to keep them from extending beyond six weeks. One foundryman reports that the influx of special jobs which extended many backlogs during September is now completed, but that backlogs are still growing from standard jobs.

Foundry purchases of No. 1 cupola cast have firmed the cast scrap market in this area. Most melters are paying between $42 and $45 per gross ton.

Cleveland . . .

MORE than one hundred foundrymen who gathered in Cleveland recently are optimistic about the iron and steel business picture, according to a poll taken among them. The foundry executives from Ohio, Pennsylvania, and Michigan were the guests of American Steel & Wire Division, U. S. Steel Corp., at an inspection of new blast furnace "A" located at Central Furnaces & Docks. The foundrymen, pig iron customers of American Steel & Wire, visited the 1350-ton-daily capacity furnace to watch it produce some of their current and future iron requirements.

During a noon luncheon, the men were queried for their opinions concerning:

The outlook for general business conditions for the fourth quarter of 1954, as well as for 1955.

They were asked to predict the national steel ingot rate for the balance of this year, as compared to the then current rate of 71 per cent and to estimate 1955 ingot percentage.

Written answers to the questions provided the following optimistic predictions for the immediate future and approaching year.

To the questions "In your opinion what is the outlook for activity in the foundry industry for the balance of this year as compared with current levels?" the answers were: Worse—5. Unchanged—36. Better—55. Much better—4.

"What about the foundry industry's prospects in 1955?" Poor—1. Fair—50. Good—47. Very Good—2.

To the query, "Do you look for general business conditions to improve for the balance of this year?" the answers were: Yes—77. No—23.

"What about 1955?" Worse than 1954—3. About the same—36. Better—57. Much better—4.

About 78 per cent of the foundrymen expected the steel ingot rate to be better during the balance of 1954; and 61 per cent thought that the fourth quarter ingot rate would rise to 75 per cent or more of capacity. For 1955, 87 per cent of the men felt that the steel operating rate would be above the current 71 per cent; 77.5 per cent of them estimated the 1955 rate to exceed 75 per cent of rated capacity.

New York . . .

SO FAR this fall district foundrymen have had difficulty detecting much business improvement. But sentiment is better and casting producers anticipate a more pronounced uptrend in November, at least on a daily work-day basis, which rules out holidays and the fact that November is a shorter month than October.

Gray iron shops average around four days a week, with building requirements bolstering the over-all average more than those of any other line. Of course, various foundries are not directly affected by building to any important degree. Most iron shops quote two weeks delivery or less.

Brass and bronze shops feel the effects of building demand more than the ferrous foundries. However, general business with these shops is still slack and it is doubtful if any one is operating at more than 75 per cent of normal capacity; a number are definitely operating at less. Ship and pump requirements are lagging, among the major lines.

In aluminum, aircraft is the only high spot, and that is affecting only a relatively few plants, with backlogs still tapering. Malleable work is fairly brisk, despite a lack of railroad business. Some shops have backlogs of seven to eight weeks. Steel foundries report business as spotty.

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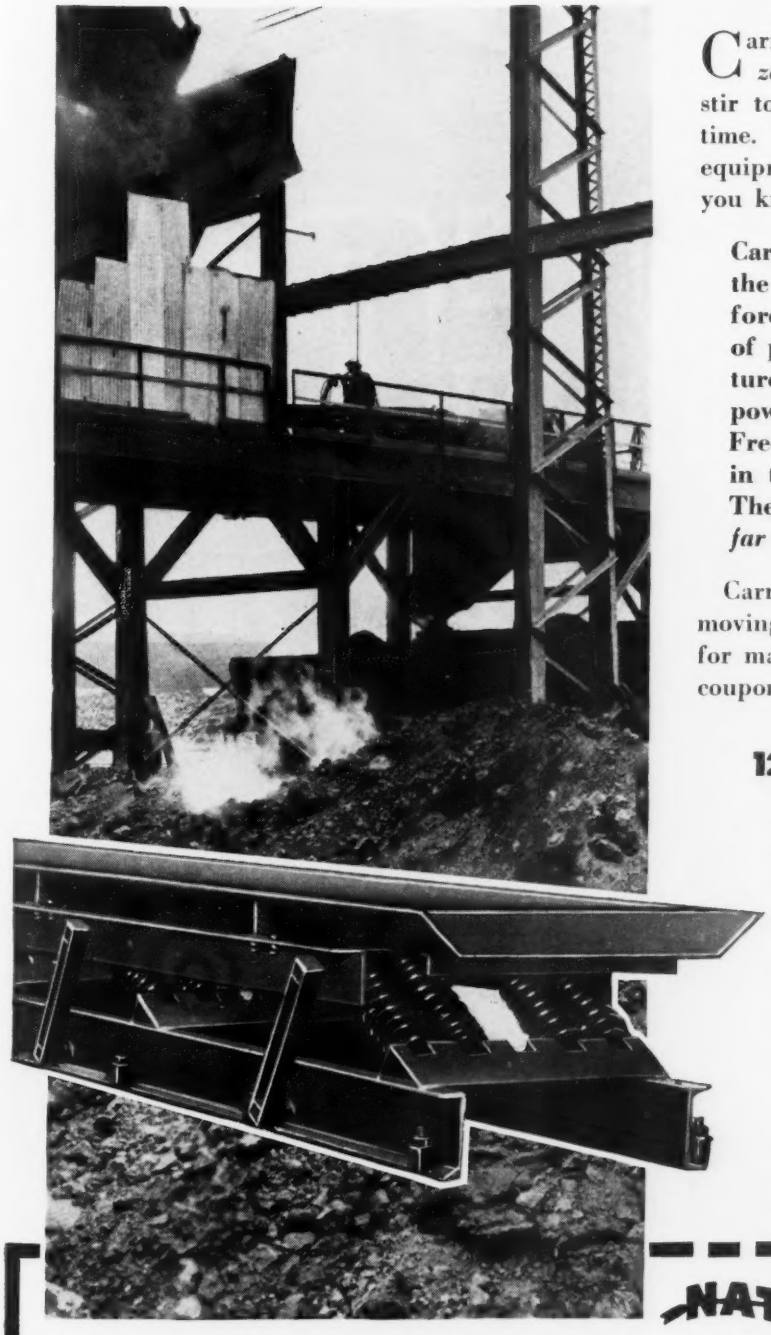

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Metallizing gun is used in production line salvage of motor blocks. Metallizing Engineering Co. photo

Dot-Weld pistol in use repairing a large casting. Photograph courtesy of Metallizing Co. of America

Repairing Faulty Castings

By JOHN E. HYLER

THE field of casting repair is different from what it was years ago. One reason for this is improved foundry technique. For instance, foundrymen now know that hot tearing and cooling cracks are completely different phenomena. One important visual difference between a hot tear and a cooling crack is that the first is not continuous but usually consists of a number of unconnected tears, while a cooling crack is a continuous split in the casting.

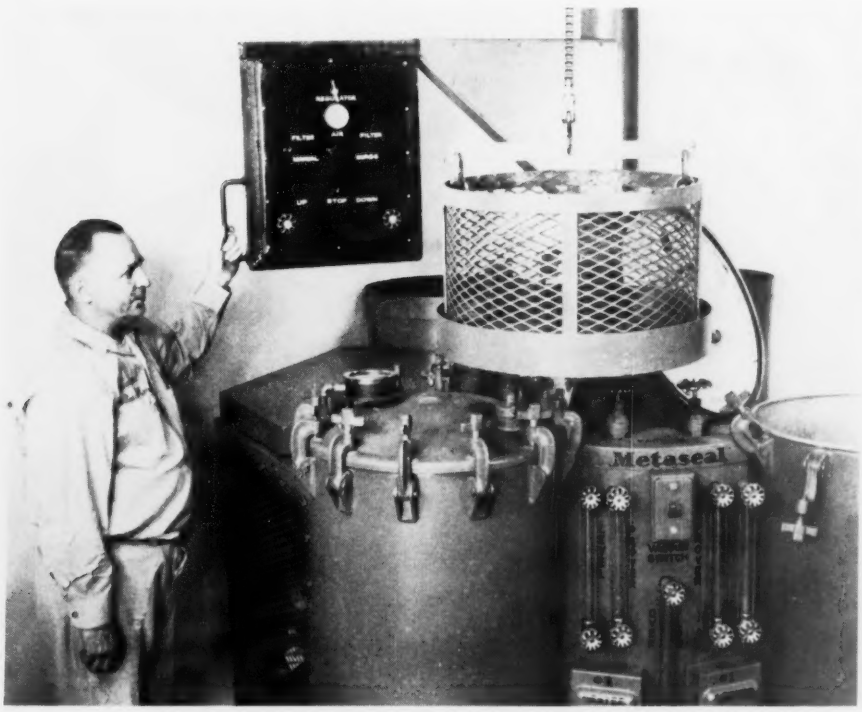
Better appreciation of the importance of stress relief has prevented many defects that otherwise would occur. When castings come to a cleaning department containing powerful stresses, even a small amount of stress added during a cleaning or other operation, to what is already present, may cause breakage. Improvements in stress relief and foundry technique have lessened occurrence of many types of defects, but much repair work nevertheless remains to be done.

Inspection and repair techniques have made great advances, providing operators with a choice of methods in casting repair, depending on requirements, volume of work to be done, and other factors. Straightening warped castings may or may not be considered as one aspect of casting repair. Many malleable castings continue to be straightened in hydraulic presses.

Cement Application — Many castings which have a poor appearance, because of surface imperfections, are basically sound. In such instances, the only repair required may be good iron filler cement.

Sufficient filler powder is mixed with water to make a thick paste. Then the material is pressed into the defect hole and smoothed with a putty knife. The cement should be mixed in a clean container and care taken to see that the castings are free of oil, grease and dust before placing the cement. The cavity should be rough and the patch keyed

(*Continued on page* 212)



Impregnated castings are raised from autoclave and placed in transfer pan to avoid dripping. Photograph courtesy of American Metaseal Corp.

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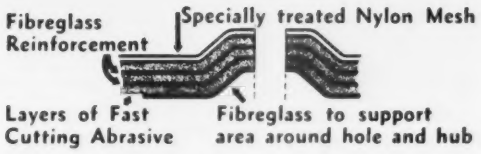
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(*Continued from page* 209)

into the hole, so it will bond firmly to the casting.

One trouble has been that the repair cement used did not always match the color of the casting. To eliminate such unsightliness, some manufacturers of iron cements provide them in different colors. One cement is provided for light gray castings, another for medium gray and a third for dark gray.

Intermediate shades are obtained by rubbing or dusting dry iron cement powder onto the surface immediately after the filling has been placed. Repair cements also are made having the color of aluminum and bronze.

In repairing minor defects, tooling out the defect often will suffice to reveal its scope. The same general procedure can be employed when larger defects are involved. However, this method can result in loss of the casting. To avoid such loss, some method of inspection should be used which does not involve chipping away any considerable amount of metal. One method is radiography, employing either x-ray or gamma ray. Magnetic particle inspection and fluorescent penetrants also are used extensively for nondestructive tests.

Repair Welding — In instances where defects can be opened up properly, they may be repaired by welding. Usually, cuts are chipped into the defect in such manner that the sides slope outward to form an included angle of 35 or 40 degrees. There are cases in which the cut will extend through a casting. Then, a backing plate must be applied to one side of the opening, so the first layer of weld metal placed will be held properly. However, if the cut is very narrow at the bottom, weld metal may bridge the gap satisfactorily.

Occasionally an opening is too large to allow filling completely with weld metal. Then, in the case of steel castings, a properly shaped piece of material can be tack-welded at several points to form a patch. Subsequently, the adjacent sides of the patch and the casting proper are sloped back enough to give an angular opening, which can be filled with weld metal.

Both carbon arc and metallic arc welding are used. Gas welding also is employed, and so-called thermit welding has been used on particularly heavy work. Other methods used include brazing, with either a suitable brass or hard silver, and soldering, where high structural strength

(*Continued on page* 215)

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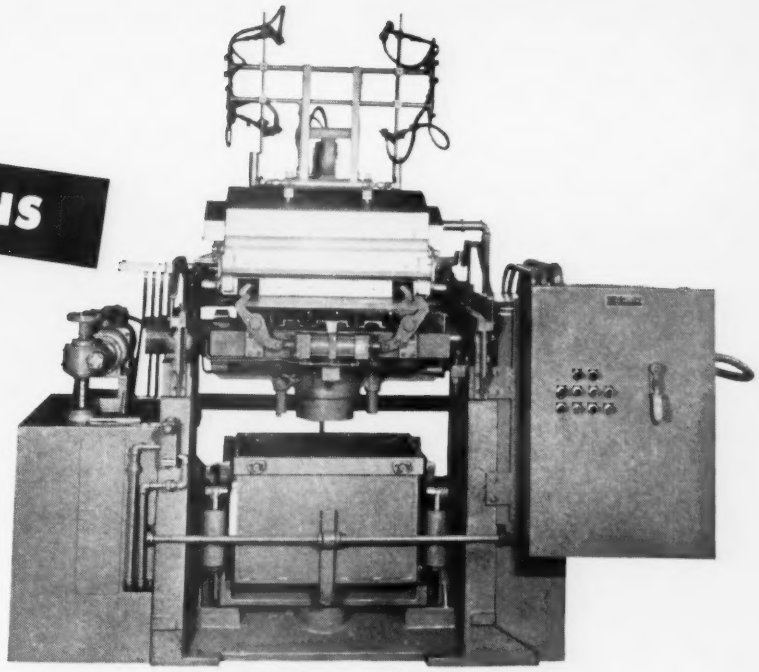

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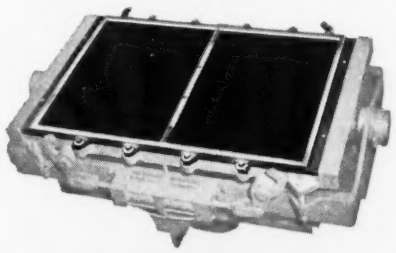
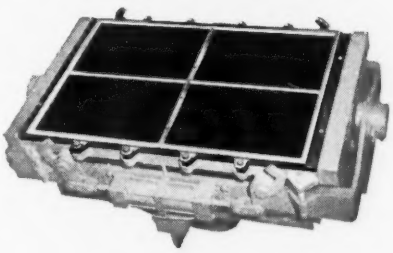
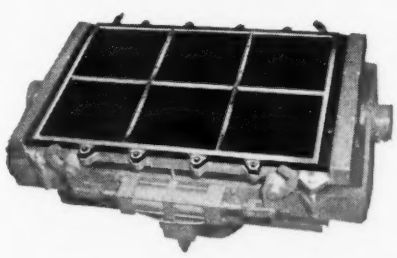
(Also available — SP-1100 with 26" x 41" shell area)

Quick-change mask frames shown here are typical examples of arrangements that are being used successfully in foundries throughout the United States and abroad. Other combinations are available to fit your requirements . . . making short runs possible and profitable.







Long recognized as the outstanding equipment for long run production, Sutter Automatic Shell Molding Machines have also proved to be the answer to short runs in jobbing type work. In fact, many of these versatile machines are used exclusively for short run production.

With these flexible Sutter units, you schedule production to meet your own requirements . . . efficiently and economically. Using Sutter quick-change mask frames, the complete pattern area is utilized. Using patterns with integral stripper pins, pattern costs are kept at rock bottom. Too, interchangeability is quick and easy, reducing downtime to a minimum.

All Sutter Shell Molding Machines provide completely automatic cycle . . . feature high production capacity, adjustable coating and curing times, and uniform fine quality shells. Even unskilled labor can efficiently operate two machines and maintain up to 120 cycles per hour.

Why not investigate the profit-possibilities of Sutter Shell Molding Machines? Find out how you can use these versatile units to fullest advantage in your foundry. Send for complete data and your free illustrated bulletin today.

Exclusive United States Sales Representative:
FREDERIC B. STEVENS, INC.
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Exclusive Canadian and Overseas Manufacturer and Distributor:
FOUNDRY EQUIPMENT LTD.
Leighton Buzzard, Bedfordshire, England

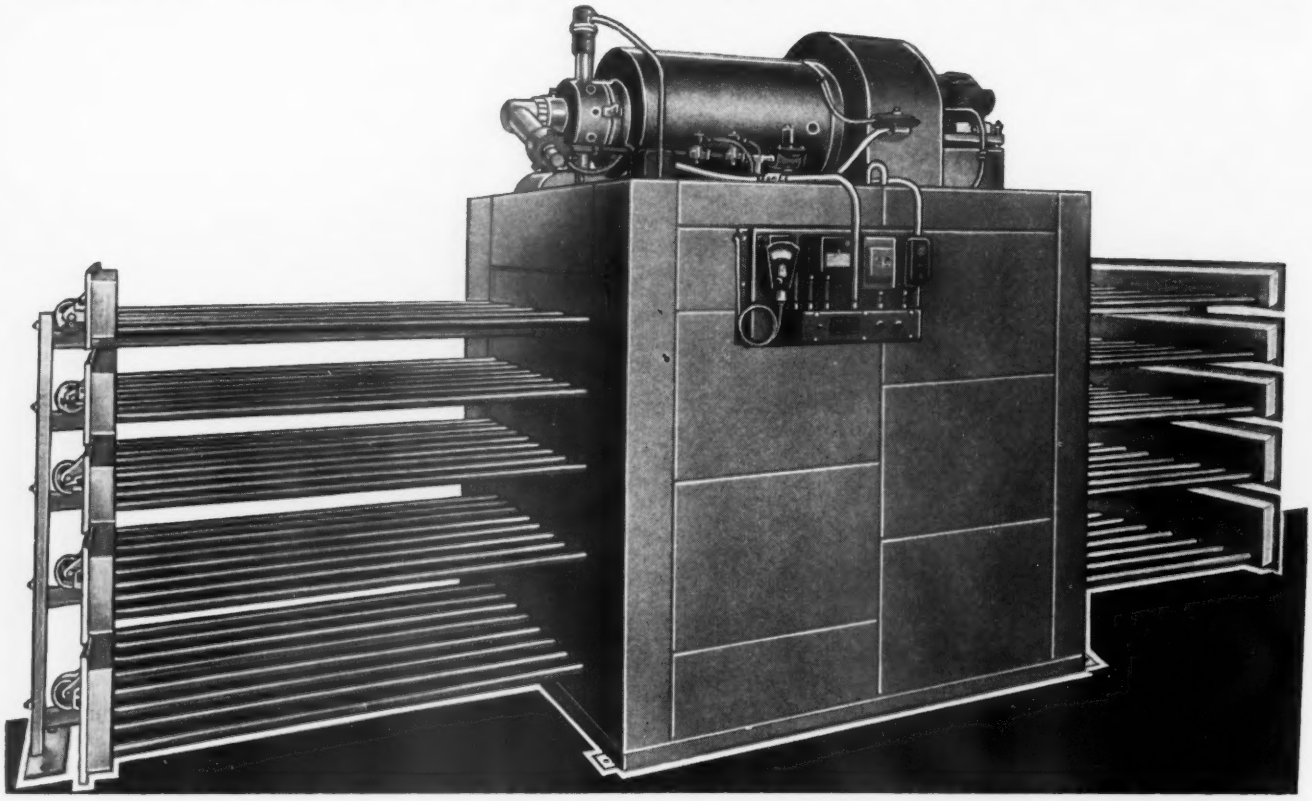
SUTTER

PRODUCTS COMPANY

Creators of foundry equipment with NEW productivity

2005 WESTWOOD AVE. • DEARBORN, MICHIGAN

PORBECK RECIRCULATING DRAWER TYPE CORE OVENS



ENGINEERS • DESIGNERS AND MANUFACTURERS

PERFORMANCE:—

This oven will give top performance by baking uniform cores year after year with a minimum of maintenance.

ECONOMY:—

Low fuel operating cost combined with high volume production make Porbeck ovens pay big dividends.

LOW IN COST:—

Only in Porbeck ovens do you get drawer types made of heavy materials and rigid construction—at a remarkably low price. Volume production of standard sizes make this possible.

SO—

If you want PERFORMANCE—ECONOMY—and more for your investment dollar, Look to Porbeck, Manufacturers of a complete line of industrial ovens.

WRITE FOR BULLETIN

Sold by leading foundry supply houses throughout the United States.

Serving Industry Since 1894

PORBECK MFG. CO. 2600 N. 9th STR. ST. LOUIS 6, MO.

(*Continued from page* 212)

or high temperature requirements need not be met. In some cases, defects are drilled out, the holes taper threaded, and plugs inserted. They later are finished off flush with the casting surface.

Metal Spraying — Metal spraying has been used to good advantage for casting salvage. In some cases, defective motor blocks, previously scrapped because of porosity and consequent leakage of cooling water, have been grit-blasted, then metallized with 0.020-in. of copper, followed with a flash coat of iron for appearance. When the leaking area is spongy, it is preheated with a torch to 400°F to expand the pores before spraying with the copper. Later, when the iron cools, it shrinks around the penetrating copper, making the casting impervious to water.

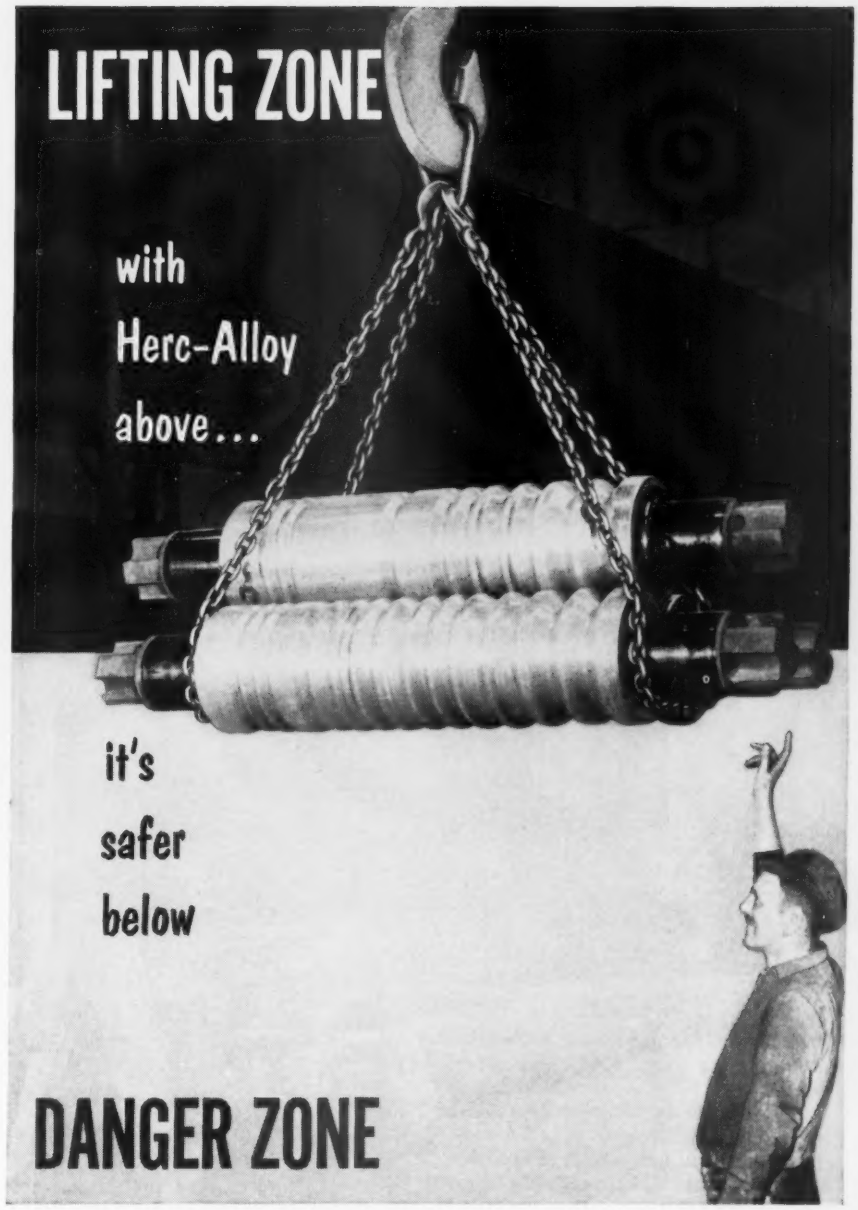
An interesting weld method for casting salvage employs an improved technique of fusing easily machined metal on castings of all kinds. Cracks in motor blocks, heads and boiler sections, are repaired in this way. The method makes use of a so-called quench-arc weld machine. This is a high-amperage, low-voltage unit operating on alternating current.

An electrode holder known as a Dot-Weld pistol is employed. It provides a penetration depth of 1/32-in. A specially designed air-pressure unit on the pistol quenches the electrode and the arc in a continuous stream of cooling air. An air cylinder incorporated in the pistol provides a vibrating action, making and breaking the arc, so that a user is really applying dots of metal. Because the metal is applied dot-wise, danger of high heat volumes resulting in heat distortion and residual stress is eliminated.

All kinds of castings, including gray iron, aluminum, steel, malleable and bronze, can be repaired readily by this process.

Pressure Testing — In instances where castings subjected to high pressure are to be repaired because of porosity or other defects, some means of testing them under pressure must be used. Where hollow castings have two or more openings, as for instance where pipe outlets are provided, some means must be devised for sealing all openings except the one through which air or water is admitted under pressure. This is often a matter of ingenuity in the individual shop. Sometimes, a special clamping arrangement will solve such a problem.

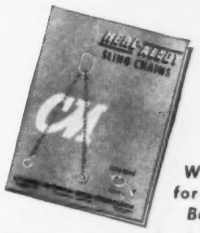
Special testing machines for this service have been developed. Generally, a so-called flush-out machine



SPECIFY

HERC-ALLOY

SLING CHAINS



Write for Data Book

HERC-ALLOY

Sling Chains are registered by individual serial number and can be rebuilt or replaced at any time to original specifications.

The Allegheny Ludlum Steel Corp., pictured above, uses Herc-Alloy Sling Chains for hundreds of tough lifting jobs in its plants. In addition to maximum safety, Allegheny Ludlum also enjoys the extra economy of longer-lasting Herc-Alloy. These sling chains offer still another advantage...a weight reduction unmatched by any other alloy chain without any sacrifice in tensile strength. This reduces worker fatigue. All things considered, don't you think Herc-Alloy Sling Chains are worth a try in your plant.

CM HOISTS AND CHAIN

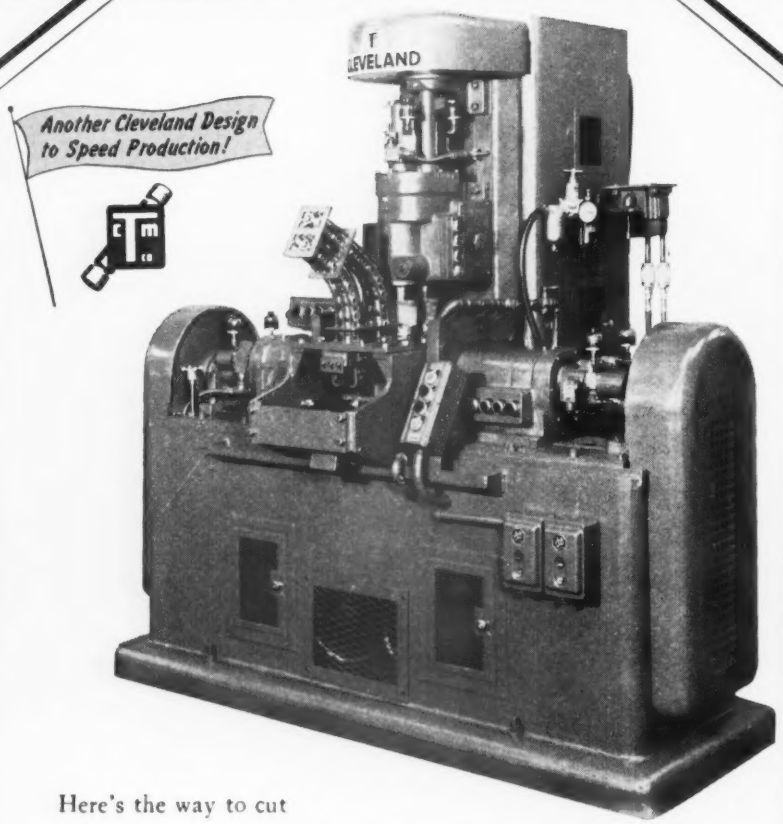
COLUMBUS McKINNON

CHAIN CORPORATION

TONAWANDA, NEW YORK

DISTRICT OFFICES: NEW YORK, CHICAGO, CLEVELAND

1308 tee fittings per hour!



Here's the way to cut costs on tee fittings! This Model FT-1 will tap 1308 pieces ½" - 14 per hour at 100% efficiency. Also handles ¾" and 1" sizes. All spindles have their own lead screw feed—assuring the precision for which Cleveland Fitting Machines are famous. Produced parts are square and within the required tolerances. Set-up and change-over time is reduced and tap life increased up to 25%. For greater efficiency this Model may be grouped in batteries of three with one operator to each battery.

If you make fittings of any size or type it will pay you to consult Cleveland engineers. Their know-how can save you money.

Write today for Catalog No. FD-114.

THE CLEVELAND TAPPING MACHINE CO.

A Subsidiary of AUTOMATIC STEEL PRODUCTS, INC.

CANTON 6, OHIO

For Better Tapping - - Faster!

CLEVELAND lead **fittings machines** screw

is used before mounting the casting in the actual pressure-test machine. These units flush out dislodged foreign matter from hollow casting interiors, and expel it through unsealed openings.

Impregnation — Some types of equipment are used for both testing and impregnating leaking pressure castings. One is a circulating machine. In this unit, the casting can be closed off, fluid can be pumped through it and pressure applied, so that leaks may be observed. Then, additional pressure is applied, and impregnating material is driven through the porous area of the casting, thereby sealing it. There are also vacuum-pressure machines, employed for batch impregnation of castings, available in different sizes. Where this type of impregnation is used, fixtures are required.

In some cases, a thermosetting resin is employed for sealing castings. Some of these resins, known to be resistant to a wide variety of solvents, including water, salts, acids, weak alkalis and other materials, can withstand continuous exposure to relatively high temperatures. Enough resilience is provided by some impregnating resins to allow the metal to expand and contract in meeting temperature variations.

Vacuum impregnation is so named because the castings, often first machined and cleaned, are placed into a chamber which can be sealed and placed under vacuum to evacuate all possible air from their porous portions. In this way, the impregnant has better access when introduced into the pressure chamber.

Tiny openings in the castings are filled with material that bonds with the metal integrally, and is nonoxidizing. Therefore, internal corrosion is prevented. Vacuum impregnation usually is successful in proportion to effectiveness of the vacuum itself, for if air is driven into the pores of the material ahead of the impregnant, it will be compressed, and will block progress of the impregnant. If and when castings can be completely evacuated, penetration of impregnant will be practically 100 per cent.

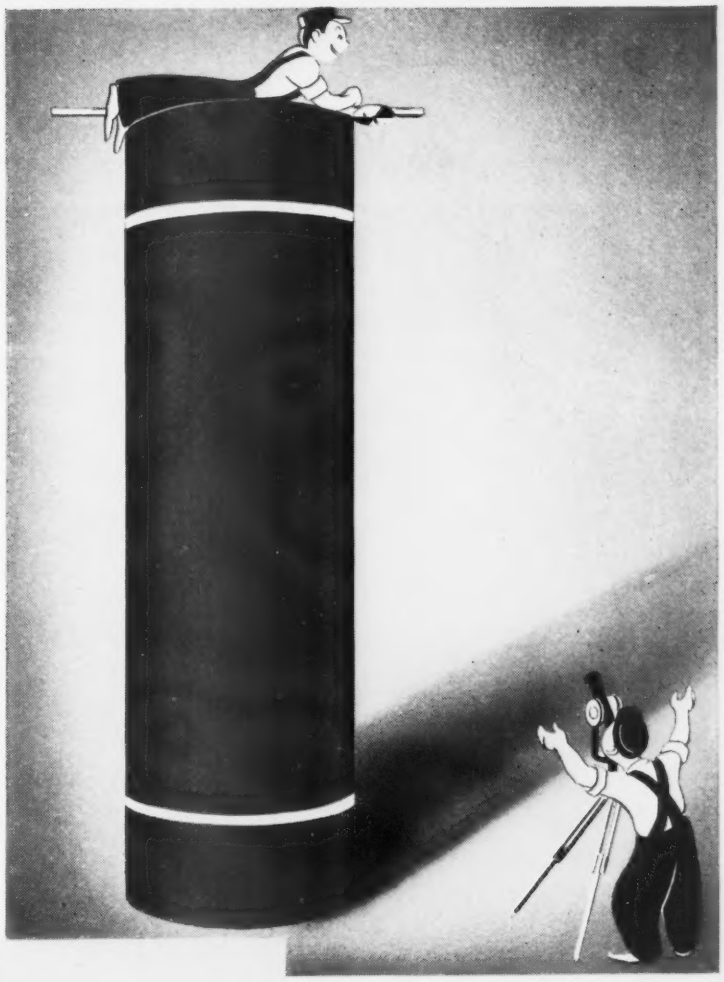
Preliminary degreasing, rinsing and drying often are included in a vacuum-impregnation process. After castings have been loaded into the chamber, evacuated, immersed in the impregnant, and pressure applied to drive the impregnant into the pores, they are removed from the equipment, drained, cleaned, rinsed and cured. The castings may be subjected to a subsequent pressure test.

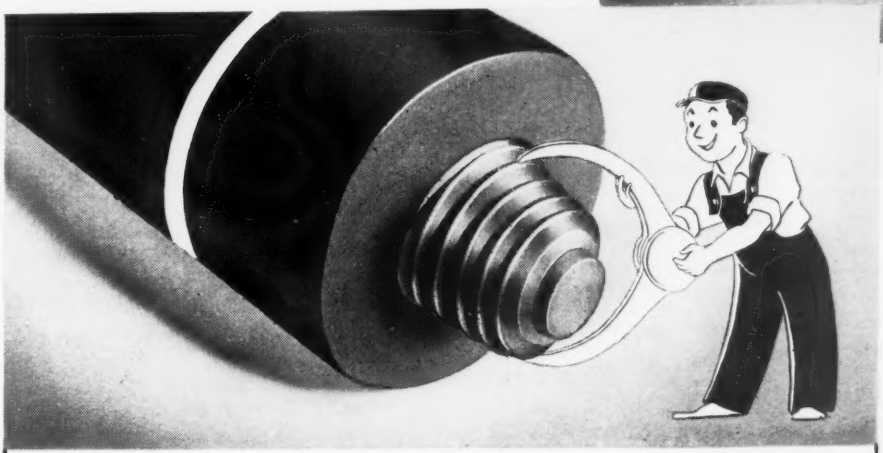
(*Concluded on page* 219)

Want greater Electrode Savings?

Take these tips from

NATIONAL CARBON





LOOK AT NIPPLE SIZE. Electrode nipples are another potential source of economy and improved performance. For example, if you use electrodes of 16″ diameter or larger, and you are not already using the smaller nipples *pioneered by* NATIONAL CARBON COMPANY, you may be able to make this switch and save money while getting even stronger joints due to the thicker socket-walls provided by the smaller nipple sizes.

LOOK AT ELECTRODE LENGTH. Frequently we are able to direct customers to valuable economies in cost-per-pound of electrode, as well as to other cost-saving advantages, simply by recommending a longer length than they are already using. For instance, when you switch from a 60″ electrode to one of 72″, you reduce the number of electrodes, handled and used, by *one in six*, and, even more important, you cut down the number of joints made by the same high percentage. Obviously, this increases furnace-availability and boosts production.

• These are only two of many ways that NATIONAL CARBON'S electrode technical-service facilities have helped users get the most for their electrode dollar. Let your NATIONAL CARBON representative survey your electrode and nipple requirements. He may help you get substantial savings and improved electrode performance.

FOR ELECTRODES AND ELECTRODE SERVICE...rely on NATIONAL CARBON COMPANY!

The term "National" is a registered trade-mark of Union Carbide and Carbon Corporation

NATIONAL CARBON COMPANY

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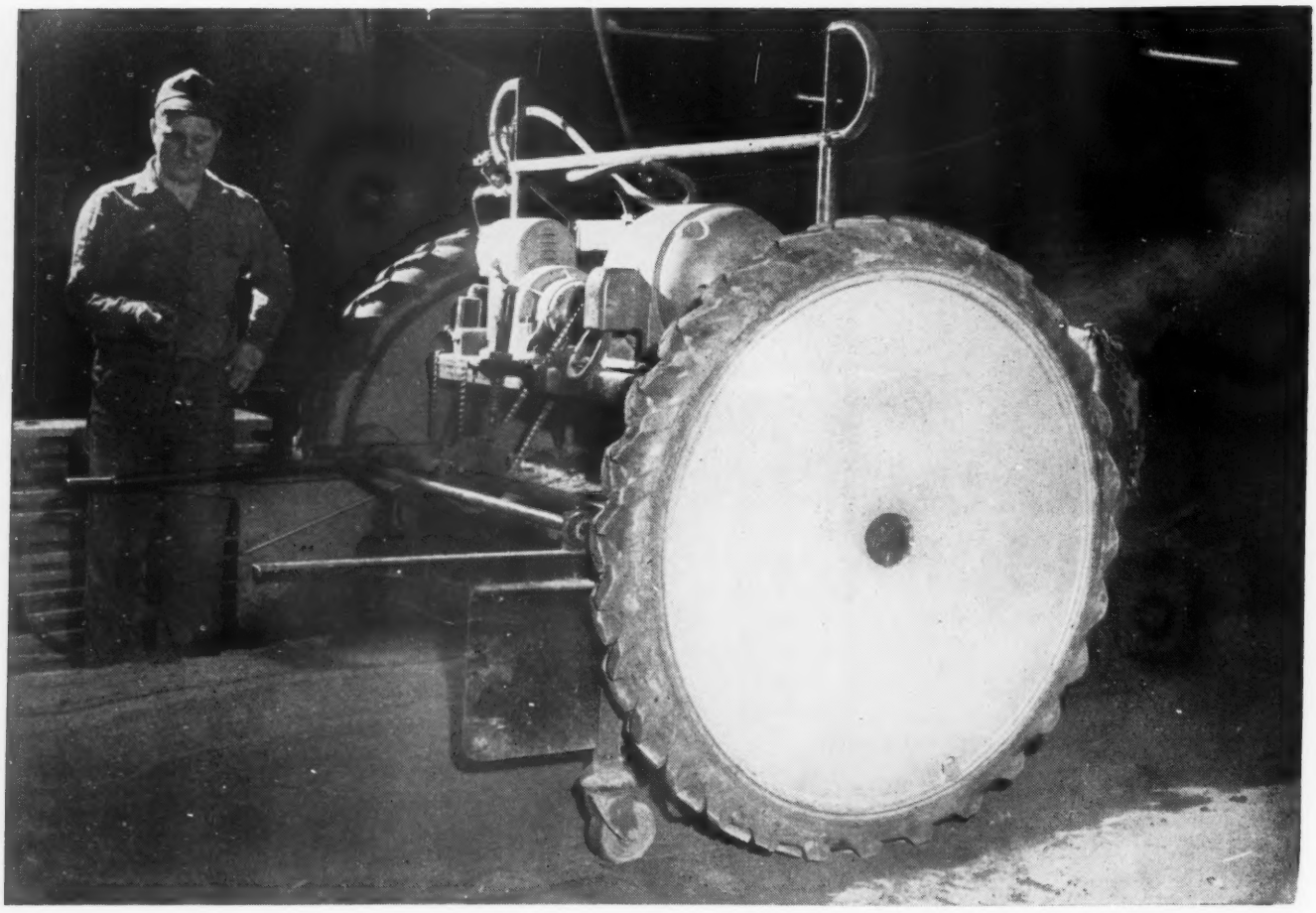
IN TUNE WITH THE TIMES WITH *"The Moulders' Friend"*



Costs rise higher and higher every year. To keep in tune with the times we must find cheaper ways to do the job better.

Foundrymen who use The Moulders' Friend sand conditioner agree that the thousands of flat tempered steel wires in the brush revolving at high speed do the most thorough job of mixing and aerating sand heaps on the foundry floor.

The Moulders' Friend is completely self-propelled. It has a capacity of two tons of thoroughly conditioned sand per minute with travel speeds up to 50 feet per minute. One man does the job.

A screen for removing trash and tramp iron and a water dispenser for accurately wetting down the sand as the machine travels over the heap are valuable added features.

The Moulders' Friend fits your foundry. Being carried on two large wheels it turns short and handles well in the crowded foundry.

The Moulders' Friend will help you keep in tune with the times by paying for itself with better castings and less labor cost. Try a Moulders' Friend in your foundry.

Ask For Our Special Proposition

THE BRUSH DOES THE JOB

"The Moulders' Friend" • Dallas City, Illinois

(*Concluded from page* 216)

Aluminum and magnesium castings used in the aircraft industry are impregnated by this method. Porosity often has been more of a problem with light metals used in aircraft manufacture than with others. Specialists in the field of casting impregnation have developed outstanding equipment for this purpose. One complete impregnation system, employed where volume of castings is large, incorporates a self-contained unit made up of autoclaves of vertical axis type, a high-vacuum pump, thermostatically - controlled wash tanks and a mechanical surging unit.

Though machines of the standard type described are widely used, special custom-built systems also may be obtained for use with practically any type of impregnant. Such systems may incorporate all components already mentioned, and special curing ovens, drainage tables, inspection tables, and other auxiliaries may be incorporated if desired.

Published Study of Data on Skilled Labor Force

The United States Department of Labor has published a study of census data on the craftsman population of the United States, 1870-1950. The publication, "The Skilled Labor Force," includes information on the distribution of craftsmen by industry, trade, and locality; their ages and educational background; their income and status; the numerical relationship of craftsmen to the population, and trends in the growth of the various crafts during the past 50 years.

The illustrated volume, written for the layman, is available from the Superintendent of Documents, U. S. Government Printing Office, Washington 25. Ask for technical bulletin No. T-140. Cost is 45 cents a copy.

British Institute Prints Report of Proceedings

The Institute of British Foundrymen has published its annual proceedings containing reports of the 16 technical papers presented at the 50th annual general meeting of the institute in June, 1953, and a selection of 14 papers presented at various branch meetings during 1952-53. The annual meeting is covered fully as are the annual report of the institute and the report of the technical council. The 16th annual Edward Williams Lecture on "Aspects of Nuclear Fission of Interest to Foundrymen and Metallurgists" also is included.

IF YOU WANT LOWER CLEANING COSTS, THEN YOU WANT A STEEL SHOT THAT GIVES YOU ALL THIS!

- **Maximum cleaning speed**
- **Longer abrasive Life**
- **Minimum parts wear**
- **Low purchase price**

TRU-STEEL is that kind of steel shot. Controlled chemical analysis has made Tru-Steel a high-carbon steel shot of tool steel quality . . . with the proper hardness for fast, thorough cleaning. And Tru-Steel *lasts* because it's scientifically heat-treated and drawn for maximum toughness. Machine parts last longer, too, because Tru-Steel does not break into fines that cause wear.

Cost? Thanks to new equipment and improved manufacturing techniques, Tru-Steel's purchase price is lower* than any other steel shot of comparable analysis and heat-treatment. In other words, you get the best for less. Compare costs yourself and see.

Sound logical? Write us today. We'll be glad to send you full information and prices.

**In sizes most popular for blast cleaning.*

STEEL SHOT PRODUCERS, INC.
BUTLER, PA.

Subsidiary of Pittsburgh Crushed Steel Co., Pittsburgh, Pa.

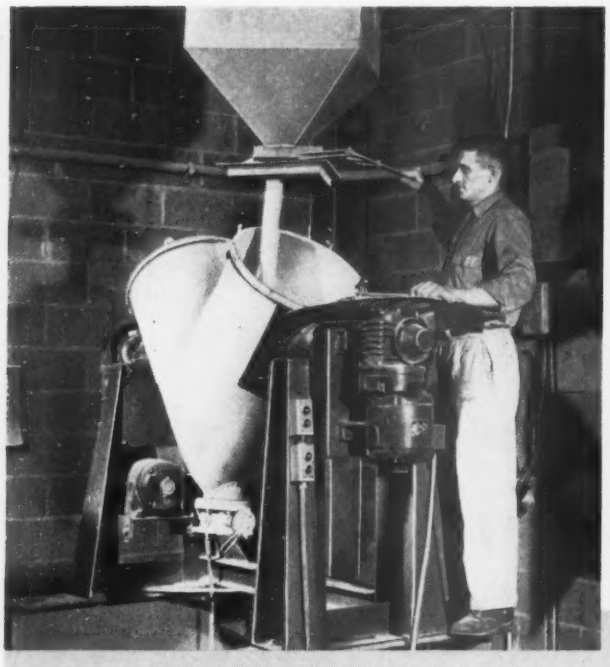
Oldest and largest manufacturers of metal abrasives in America

p·k Twin Shell Blender*

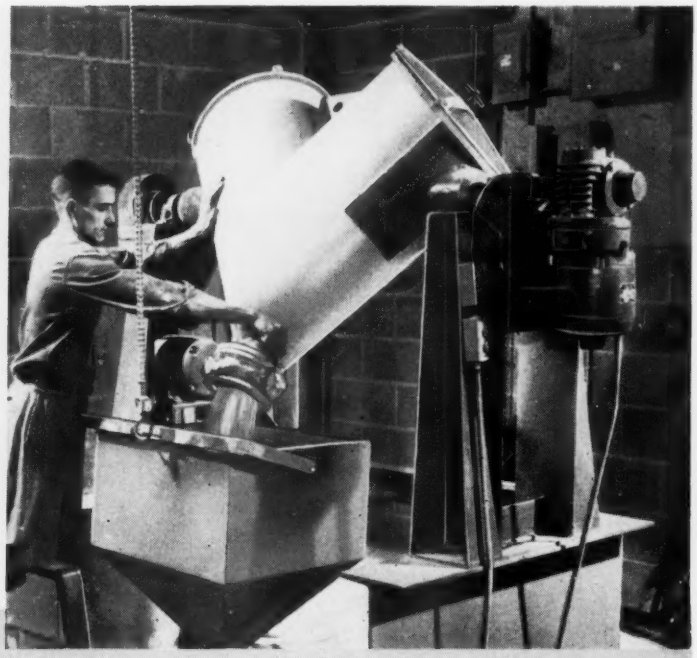
Cuts Blending Time in Half

for the Midwest Foundry Company

Photo courtesy of United Press

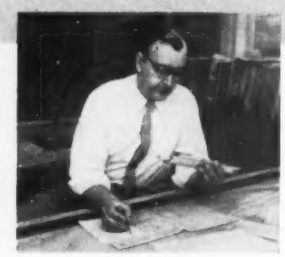


Feeding fine-grain silica sand and phenol-formaldehyde resin through one of the large access openings in the p·k twin shell blender.



Thoroughly blended shell-mold material is discharged into hopper before going to the shell molding machine. An electric hoist allows use of the same hopper for feeding material to the blender.

* Patented



Albert H. Doerr, chief engineer, Midwest Foundry Company, Coldwater, Michigan.

At Midwest Foundry Company (Coldwater, Mich.) the mixing of shell molding compound in a 5-cubic foot p·k twin shell blender actually *halves* the mixing time required by conventional mullers. This is the conclusion of Mr. Albert H. Doerr the Company's chief engineer.

The shell molding machine operator handles the p·k blender without interrupting his other duties and dustless precision blending takes only six to eight minutes for a 425 pound load. In this brief time, Mr. Doerr reports, the blender, equipped with the exclusive p·k intensifier bar* produces ". . . an even blend without resin segregation."

The easily removable intensifier bar rotates at high speed (2200 fpm) on the axis of the blender, creating a zone of intense activity into which blender action constantly feeds fresh material. The absence of baffles or obstructions of any kind permits complete, rapid discharge, and easy cleaning.

Because of the fast, efficient mixing afforded by this combination of tumbling and intensifier action, the p·k twin shell blender is widely recommended for use in the shell molding process. The right blender for your foundry is included in the full range of standard sizes—capacities from 4 quarts to 250 cubic feet.

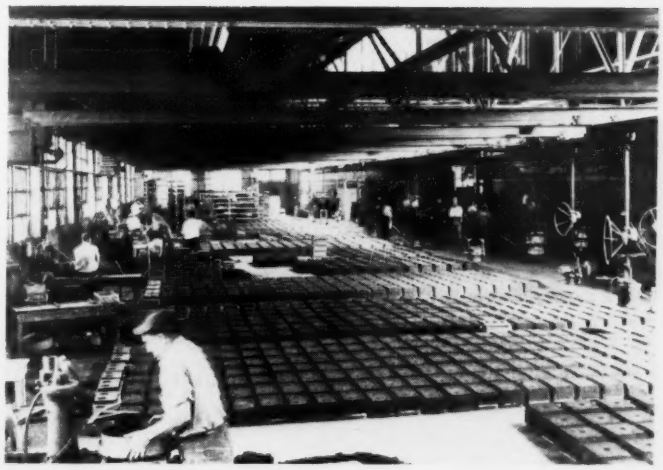
Write today for Shell Molding Process Bulletin 404.

the **Patterson-Kelley Co.,** inc.

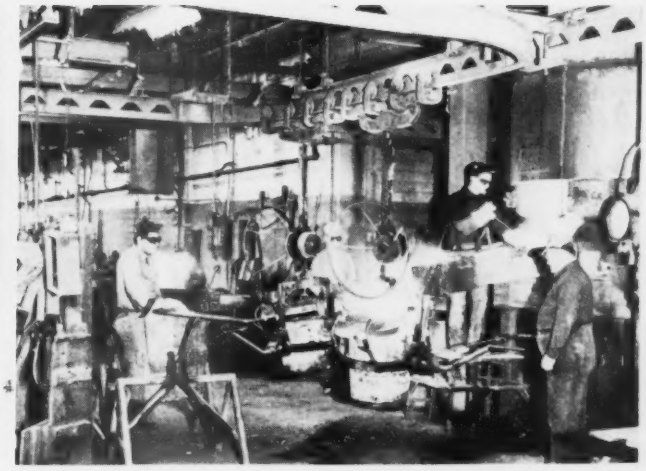
1410 Lackawanna Avenue, East Stroudsburg, Penna.

2538

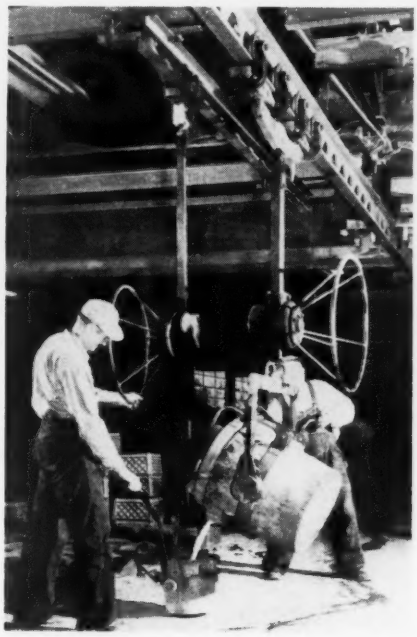
101 Park Avenue, New York 17 • Railway Exchange Building, Chicago 4 • 1700 Walnut Street, Philadelphia 3 • 96-A Huntington Avenue, Boston 16 • and other principal cities.



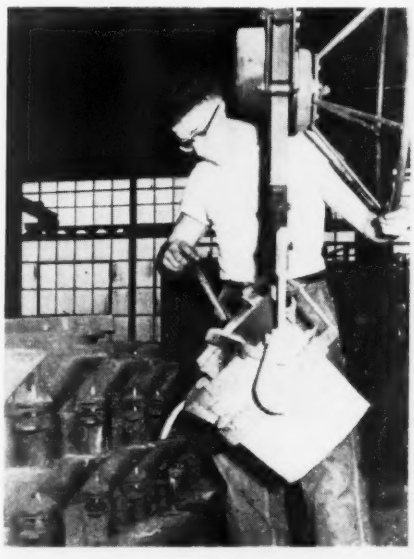
Over-all view shows some of cranes serving production areas and monorail line for hot metal transport



Cupola is tapped into 1000-lb capacity transfer ladles which move on the monorail to the pouring areas



Above, metal handling and transfer are completely mechanized. *Below*, mechanization permits higher stacking, as with these plowshare molds



OVERHEAD HANDLING

Increases Production Capacity

OVERHEAD handling system combines individual pouring cranes and monorail transport of hot metal at the Lacrosse, Wis., foundry of Allis-Chalmers Mfg. Co., Milwaukee. Production capacity has been increased substantially, and other benefits also have resulted.

Molds can be stacked higher than was possible formerly, decreased floor traffic has reduced dust, and employee morale and productivity are reported to be higher. In addition, a special crane has achieved faster, more efficient cupola charging.

Faster handling has eliminated the need for a reservoir ladle, and metal is poured directly into 1000-lb capacity transfer ladles. Where 25,000 lb of metal previously were poured in 2 hours and 20 minutes, from 35,000 to 40,000 lb now are poured in the same length of time.

Transfer ladles move to the tapping area on a monorail "sidetrack" which avoids traffic jams between filled and empty ladles. After filling, they move on the main monorail line to the production floor. At each of 27 production areas, the transfer ladle discharges metal into the smaller pouring ladle.

At the cupola, a crane installed outside the building lifts a cone-bottom bucket from the pit to the level of the charging door, then runs the bucket into the wishbone support in the cupola. Time cycle for a 2000-lb charge has been cut to 4½ minutes.

Both the cranes and the monorail are Whiting Trambeam systems, manufactured by Whiting Corp., Harvey, Ill.

Olivine Production Starts In Washington

Early production of olivine for use in foundry sand, sand blasting and refractory applications has been announced by Scheel Olivine Inc., 201 Polson Bldg., Mount Vernon, Wash.

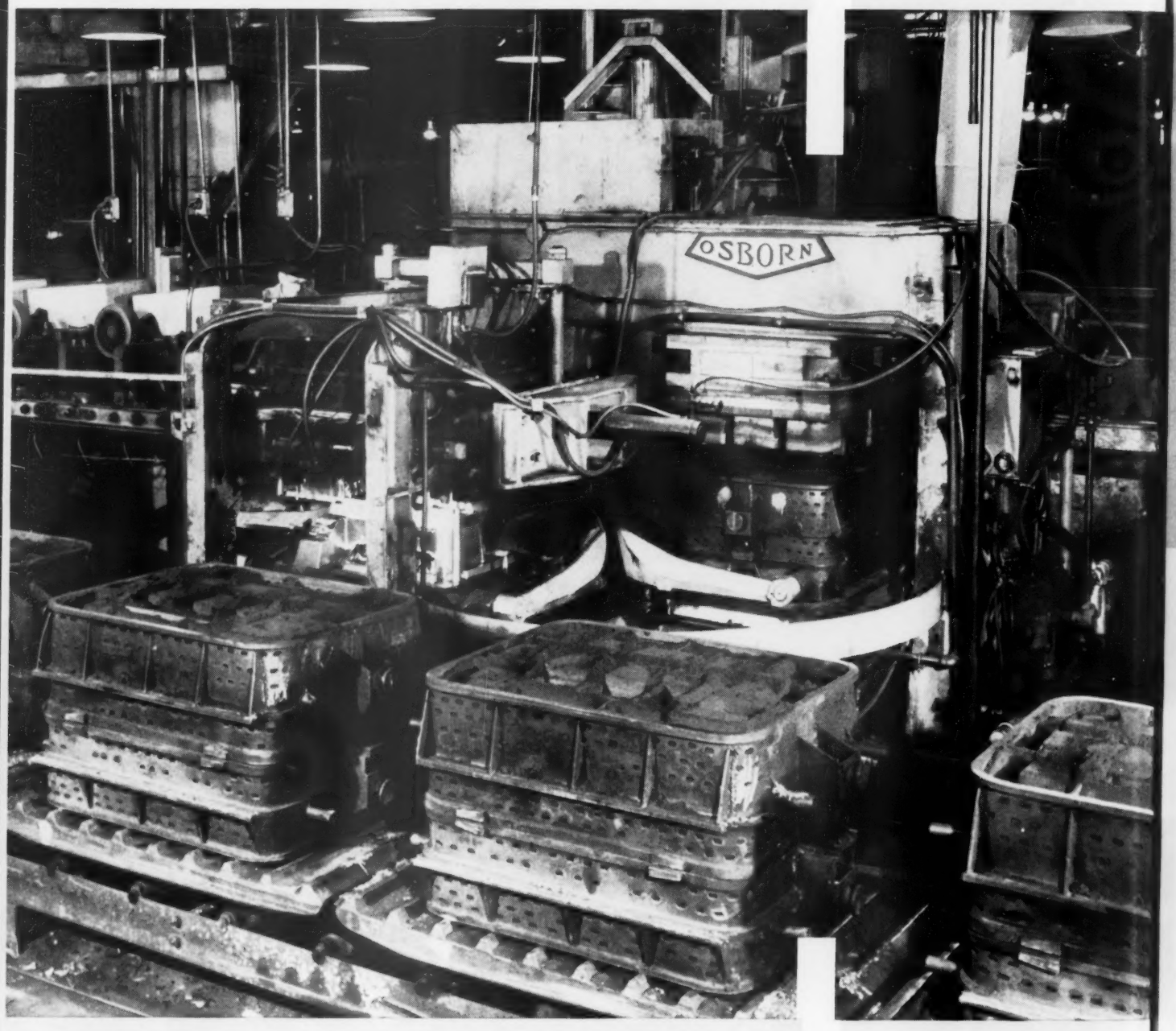
Scheel Olivine, a new corporation, has taken over the assets of the former H. P. Scheel Co. Officers of the new company are H. P. Scheel, president, Kermit B. Bengtson, vice president, and Walter E. Bergstrom, vice president and general manager.

Scheel's olivine deposits are located in the Twin Sisters area of the Cascade mountains in the state of Washington. These deposits are said to be the largest and purest in the world. Olivine is composed of fayalite, $2FeO \cdot SiO_2$, and fosterite, $2MgO \cdot SiO_2$, closely fused together. Olivine's melting point is given as 3360° F. Low uniform expansion is said to be a characteristic of olivine molding sand which has been used extensively in Norway.

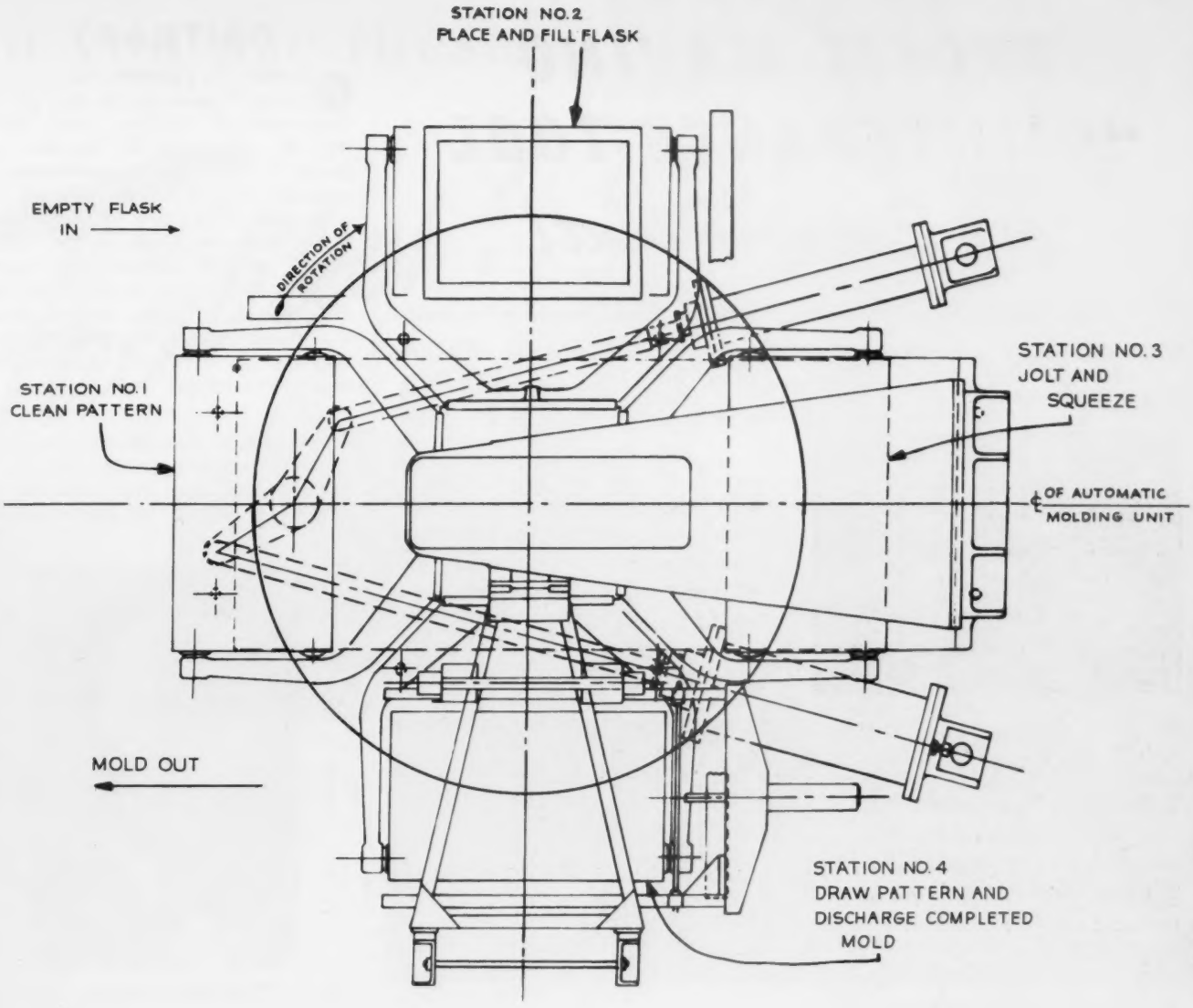
Automatic Molding

...another OSBORN first in foundry automation

Copes and drags for cylinder blocks are being produced at rates of 180 an hour . . . can be increased to 240 an hour . . . with considerable savings in costs.



At leading automotive foundry. One of two Osborn Automatic Molders in operation making cylinder block molds. One machine makes copes . . . another machine makes drags. Molds are uniform quality . . . held to close dimensional tolerances.



Plan view of Osborn Multiple Station Automatic Molder

for fast, efficient production of quality molds

COMPLETE production of half molds from green sand to finished copes and drags is now handled more efficiently . . . at lower costs . . . with the Osborn Multiple Station Automatic Molder. No manual operation is needed under normal conditions. Molds are uniform in density . . . held to close dimensional tolerances.

The Osborn Automatic Molder is a 4-station rotary indexing machine. Half-patterns are mounted on plattens permitting four molding operations to be performed simultaneously. These operations include cleaning and spraying patterns, filling the flask, jolting and squeezing, drawing the pattern and ejecting the finished mold.

Auxiliary equipment available with the Osborn Automatic Molder includes conveyors for handling flasks, turnover of molds and delivering finished half molds to conveyor lines where cores are set and molds closed.

Complete cost saving details on the Osborn Automatic Molder are available by writing

THE OSBORN MANUFACTURING COMPANY

5401 Hamilton Avenue *Cleveland 14, Ohio*

Another example of Osborn leadership and advanced engineering

OSBORN

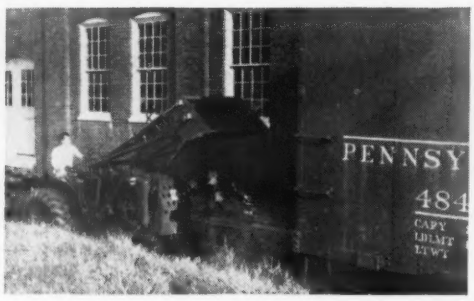
MOLDING MACHINES CORE BLOWERS

PROFIT-MAKING MAINTENANCE TOOL for Every Plant!

Every plant needs a portable air compressor. The Schramm Pneumatractor is a self-propelled 125 CFM compressor that does all kinds of things like these:

The Schramm Pneumatractor with front-end loader bucket eliminated five men on this coal moving job. (½ yard and 1 yard buckets available.)

The front winch (Maximum pull 6000 lbs.) does not interfere with the front-end loader. It is hydraulically operated.



It is a portable crane that picks up and carries loads up to 2500 lbs. even with or without the backfill blade or the bucket installed.

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OBITUARY

GEORGE P. FISHER, 65, who retired 4 years ago as vice president-personnel, Whiting Corp., Harvey, Ill., died Sept. 30. In 1951 he joined the Economic Cooperation Administration and headed a team of American foundrymen which consulted on foundry conditions in Italy, France and the Netherlands. Later he was chief of the Foundry Equipment Section of NPA's Metalworking Equipment Division. Mr. Fisher joined Whiting in 1917 and was foundry superintendent for many years.

* * *

Arthur J. Harlan, 46, resident manager at Cleveland for Hickman, Williams & Co., died there Oct. 13. A native of Cleveland, Mr. Harlan joined

ARTHUR J. HARLAN

Hickman, Williams & Co. about 28 years ago and has been located continuously in the Cleveland territory. He was made resident manager several months ago. Mr. Harlan was a director of the Northeastern Ohio Chapter of AFS and formerly served as secretary.

* * *

Arthur E. Jones, founder and president, Arthur E. Jones Co., manufacturers' representative, Buffalo and Syracuse, N. Y., died Sept. 19. Mr. Jones was a director, Ajax Flexible Coupling Co., Westfield, N. Y., and represented the company for 30 years.

* * *

Walcott G. Van Etten, operating vice president, H. D. Conkey & Co., Mendota, Ill., died Aug. 27. He joined the company in 1911 and in later years was general manager of the Heating Division, Conco Engineering Works Division of the company.

* * *

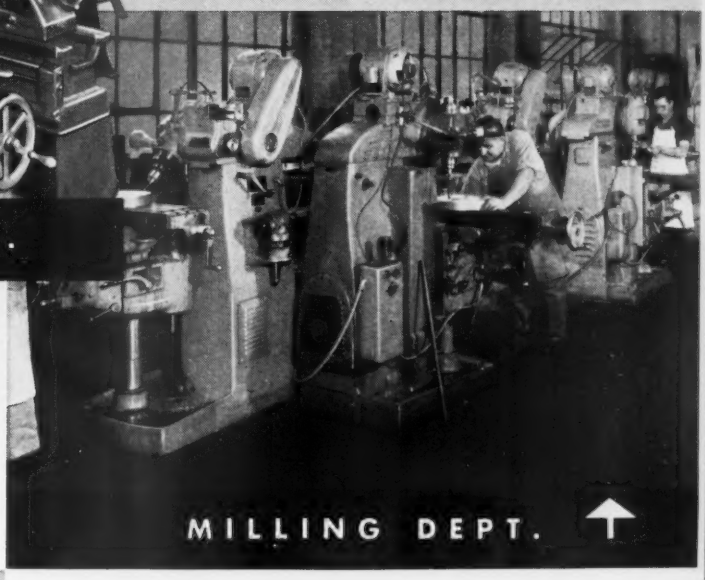
Arthur J. Heindel, 61, Michigan representative, United States Graphite Co., Saginaw, Mich., died Sept. 19.

(*Concluded on page* 226)

can you use these *Facilities?*

↑ FOUNDRY DEPT.

↑ LATHE DEPT.



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If you are looking for a reliable source for lathe work, milling and shaper work or non-ferrous castings (finish-machined or not) the chances are that City Pattern Foundry & Machine Company can fill the bill for you.

Each of these machining departments have a wide variety of modern equipment to handle almost any type of work that you might need. You'll find City Pattern Foundry and Machine Company an interested and economical source for both short and long runs.

In the foundry department you will find one of the most versatile and modern layouts in this part of the country. And, every conceivable laboratory control and testing device is on hand to insure chemical and physical specifications.

We will welcome the opportunity to give you more detailed information . . . won't you drop us a line or call in your specific requirements?

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Our colorful new brochure details our complete facilities for pattern work, foundry work and precision machining. Each department is completely illustrated with over forty recent illustrations. Your request will bring one to you promptly and without charge.

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7 low-cost ways to weld steel castings

Weld with little or no preheat! Match physical, heat-treating, and impact properties! Save on cost of electrodes!

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P&H LOW HYDROGEN ELECTRODES

1. **70LB (E7016)** — Matches properties of Grade B and castings of similar analysis after heat treatment.
2. **P&H .25C (E7016)** — For castings repair where carbon is preferred to alloys for raising tensile strength. Lets you match both chemical analysis and heat-treating properties, a condition possible only with low-hydrogen coating.
3. **75LP (E8016)** — For 2% to 3% nickel steel castings. Charpy impact values of 20-35 ft. lbs. at −175° F.
4. **P&H .40C (E9015)** — For .40 carbon castings where you want to match both chemical and mechanical properties.
5. **AW2B (E9016)** — For repair welding of cast armor, "off analysis" and high-sulfur steels.
6. **P&H # 7 (E9016)** — Matches properties of Grade C and castings of similar analysis after heat treatment.
7. **90LH-2 (E10016)** — For high-tensile castings and alloy steels, such as SAE 8630, 4130, and comparable types, where the weld metal must match the heat-treating properties of the parent metal.

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2502

(*Concluded from page* 224)

Mr. Heindel was representative of the company's foundry products for 41 years.

* * *

Clifford L. Wheeler, 51, since 1950 manager of the magnesium foundry, Aircraft Engine Division, Ford Motor Co., Chicago, died Sept. 15. Prior to joining Ford in 1950, where he directed rehabilitation of foundry facilities, Mr. Wheeler was plant superintendent, Howard Foundry Co., Chicago. Previously he owned his own light metals foundry in Spokane, Wash., and from 1942-45 was assistant plant manager, Dodge-Chicago Plant of Chrysler Corp.

* * *

Hubert L. Spence, 64, assistant chief engineer, National Malleable & Steel Castings Co., Cleveland, died Sept. 21. He joined the engineering department in 1913, following graduation from Case Institute of Technology.

* * *

Robert Rullman, 70, for 25 years midwest district manager, Patterson Foundry & Machine Co., East Liverpool, O., died in Chicago, Sept. 1.

* * *

James I. McClain, 52, director of industrial relations, Farrel-Birmingham Co., Ansonia, Conn., died Sept. 27. He joined the company in 1945.

* * *

Joseph E. LeBlanc, 73, secretary and treasurer, Pacific Car & Foundry Co., Renton, Wash., died at his home in Kent, Wash., on Sept. 21.

* * *

L. D. Runkle, 53, purchasing agent, Freeman Supply Co., Toledo, O., died Aug. 2.

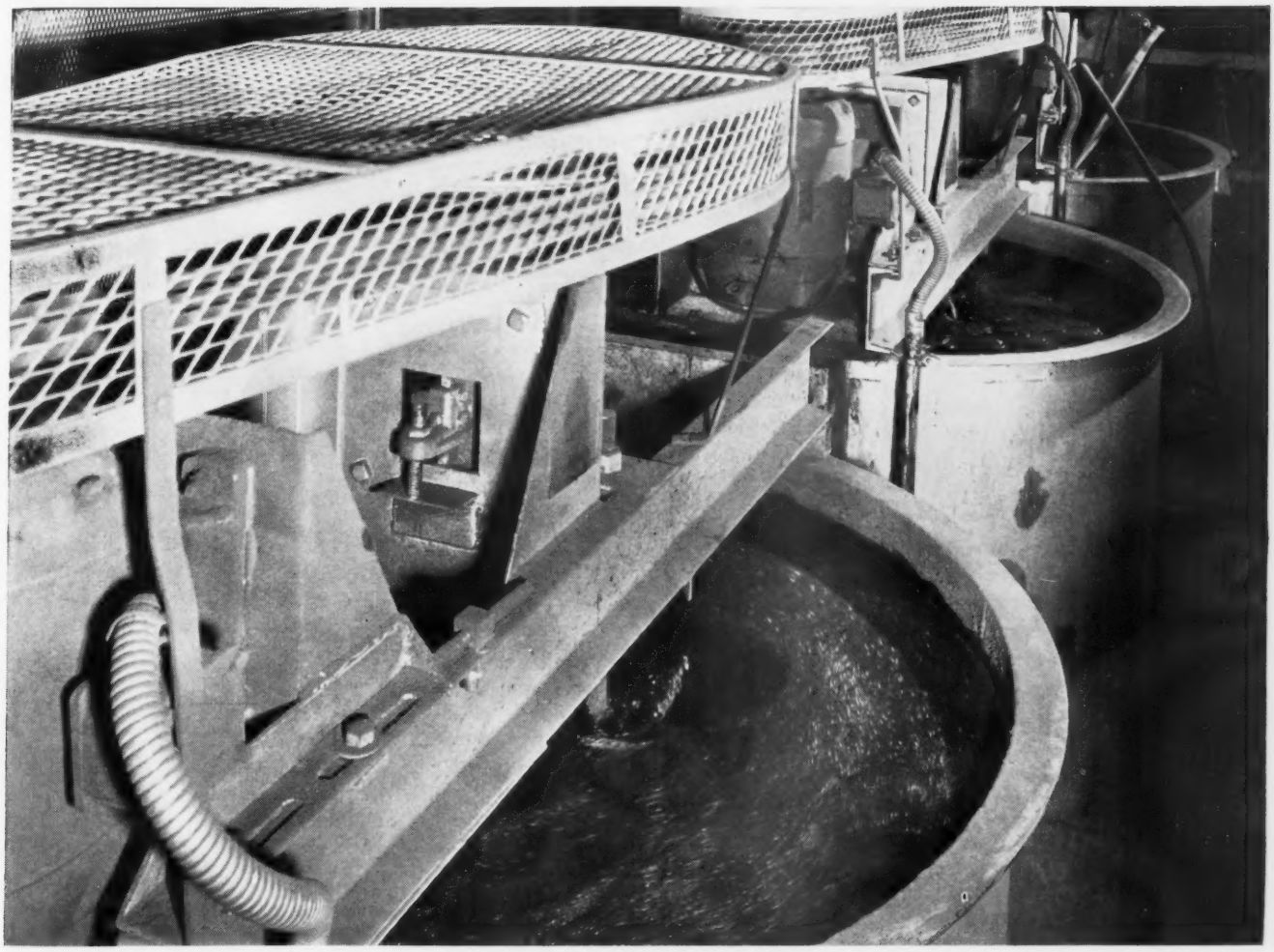
* * *

William M. Reilley, 60, president, Reilley Bros. Foundry, Harmony, Pa., died Sept. 12.

Chicago Site of Plant Maintenance Show

Plant Maintenance & Engineering Show will be held at the International Amphitheatre, Chicago, next Jan. 24 to 27. It will be the first industrial exposition to occupy the huge new $2,000,000 hall which has been built as an addition to the amphitheatre. Use of the new hall, which has 188,000 sq ft of floor space, will permit all general sessions of the Plant Maintenance & Engineering Conference to be held in the arena, directly adjoining the exhibits. Advance registration cards may be obtained from the founders and producers of the event, Clapp & Poliak Inc., 341 Madison Ave., New York 17.

Foundry Sand Reclamation



One of the big factors of high production, low costs and simplicity of operation is the patented Denver Heavy Duty Sand Scrubber pictured, above, in Denver Sand Reclamation System. Bonding material on the surface of sand grains are removed by attrition of grains striking one another inside the scrubbers at high velocity in a water and sand mix.

Foundry Sand Costs Are Cut, Sand Disposal Problems Are Solved With Denver Sand Reclamation System

Denver Sand Reclamation offers foundries another means of cutting costs and increasing profits. One Denver Sand Reclamation System, at a foundry producing 400-tons of castings per month, saved the foundry $42,864.00 a year — that's $42,864.00 in added profits.

New Sand Use Cut 50%: During the first year, 1120 lbs. of new sand per ton of castings was used, compared with 2400 lbs. of new sand per ton of castings before Denver Sand Reclamation. Cost of the 1280 lbs. of reclaimed sand used per ton of castings, on this basis, is $1.20. Goal is to cut new sand use to 600 lbs.

Reclaimed Sand Makes Better Castings: The Denver Reclamation Systems are so effective that many molders prefer characteristics of reclaimed sand over characteristics of new sand. This is because the reclaimed sand is more stable. In addition to the dollar saving features of Denver Reclamation Systems, several foundries have installed systems to solve their problem of disposing used sand—80% to 90% recovery of sand is realized.

No Charge Sand Test: We would like to demonstrate what the Denver Sand Reclamation Process will do on your discarded sand. A 100 lb. sample is sufficient. There will be no charge or obligation for a preliminary sand test. We will return the cleaned sand for your inspection and analysis.

In order that we might have as much information as possible for this preliminary test, we would appreciate your writing us first, so we can supply you a questionnaire of data necessary to make the test. Remember, there will be no charge or obligation.

Find out how you can cut your foundry sand costs —solve used sand disposal problems! Write for the Sand Reclamation Test Questionnaire, today!

DECO FLOTATION ENGINEERS — DENVER EQUIPMENT COMPANY 24 HOUR SERVICE

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DENVER, NEW YORK, CHICAGO, EL PASO, SALT LAKE CITY, VANCOUVER, TORONTO, MEXICO, D.F., LONDON, JOHANNESBURG

Sand slinger liners outwear mild steel liners 40 to 1

BR-4 . . . the only pre-ground alloy liner!

Outwears all other alloy liners

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Special Products Division

LATROBE, PENNSYLVANIA

AFS Completes Plans for Casting Clinic

Corn Belt Chapter of the American Foundrymen's Society, in co-operation with the technical department of the AFS, is sponsoring a castings clinic for the foundrymen of Nebraska, western Iowa, western Missouri, and adjoining territory. The one-day meeting will be held at the Rome Hotel, Omaha, Neb., on Nov. 12. Short course sessions will be conducted by Hans J. Heine, AFS technical director, with the assistance of a selected panel of foundry experts.

Films, slides and other visual aids will be used at the technical sessions. In the morning various aspects of gating and risering, casting design, and nondestructive testing and quality control will be discussed. In the afternoon a discussion of ferrous and nonferrous casting defects with presentation of actual case histories is planned.

There is no registration fee, and the number of representatives each foundry may send is not limited. Membership in the AFS is not a prerequisite for attending the sessions. Text and reference material will be provided to enable interested persons to study further the subjects presented.

Battelle Buys More Land

The opportunity to engage in large-scale experimental projects in engineering and agricultural fields, has prompted Battelle Memorial Institute, Columbus, O., to purchase a 397-acre plot of land 15 miles west of downtown Columbus. Battelle has grown continuously since 1935 and presently employs a staff of 2150 persons, more than double those employed at the close of World War II. In 1953 the dollar volume of research at the Institute was $13,500,000.

Fire Hazards Described

How production processes and materials influence fire hazards is described in a 56-page booklet, "Fire Hazards and Safeguards for Metalworking Industries," published by the National Board of Fire Underwriters, 85 John St., New York 38, N. Y. Illustrations show safeguards to prevent fires and the destruction caused by fires where precautions were not taken. A list of typical fires in metalworking plants includes several foundry fires. The story of each fire and the amount of loss is described.

Core Hardness

Checked in Seconds!

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Gordon & Campbell CORE HARDNESS TESTER

Why take chances with questionable cores? With this simple tester you obtain the true hardness value by measuring a definite depth of penetration of a spring-loaded abrading point. The hardness value is read direct on the graduated dial—no computation.

The Gordon-Campbell sand testing units offer the latest improvements for checking these critical properties of sand mixtures: clay content, permeability, bond strength, moisture, core hardness, and core strength. The tests are quick, and no calculations are required. They offer the simplest approach to sand control.

Write for full particulars on Gordon-Campbell sand control units. Savings in scrap losses will pay for these testing units.

All Gordon-Campbell sand testing units are designed to conform with the recommendations of the Committee on Foundry Sand Research of the American Foundrymen's Society.

FREE TO ANY FOUNDRYMAN

Write for this booklet. It explains foundry sand control and how to reduce scrap losses.

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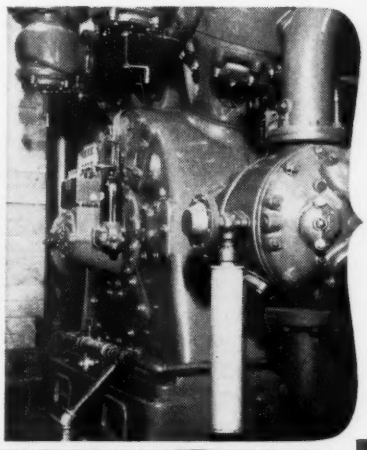
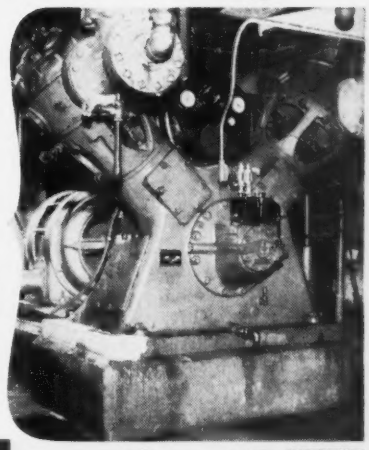
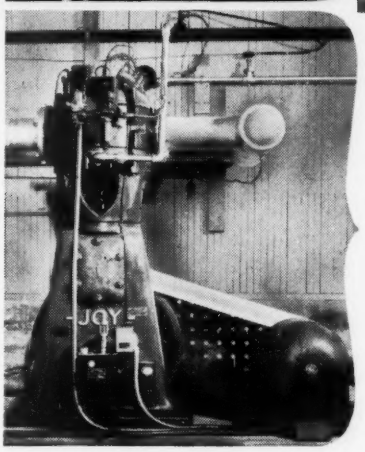
A CLEAN SWEEP for JOY COMPRESSORS



1941 Customer installs Joy WN-114 (four-cylinder, two-stage, double-acting, continuous service, 1092 to 3656 CFM) Compressor for general air service. Unit operates on 24-hour basis, 365 days a year; never shut down long enough to stop production (which depends entirely on this compressor). Compiles amazing record of *well over 100,000 hours without overhaul!*

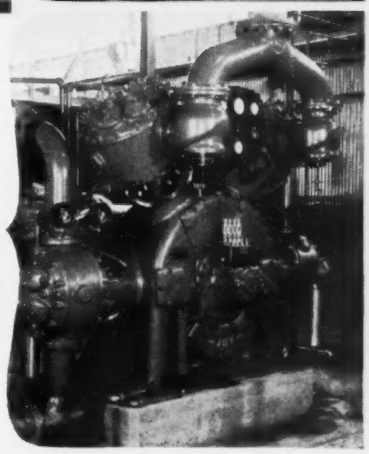


1947 Customer so impressed with WN-114's amazing record that he adds a WN-112 (two-cylinder, heavy duty, two-stage, 378 to 1838 CFM) Compressor for additional continuous duty. Confidence proves well-placed—WN-112 gives troublefree service from time of installation to present date.



1953 Following theory of staying with a winner, customer installs a Joy WG-9 (water-cooled, double-acting, heavy duty, single stage, 172 to 881 CFM) Vertical Compressor to furnish air for impact wrenches and other shop tools.

195? During construction of new power plant, customer pours concrete foundation for *another* Joy WN-114. This will be added when air requirements increase in expanded plant.



INSIST ON THESE QUALITY CONSTRUCTION FEATURES IN YOUR NEXT COMPRESSOR

- Honed, REPLACEABLE crosshead and cylinder liners.
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- One-piece, box-type, tinned crossheads.
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Let us know the type and size of compressor in which you are interested. We'll rush free detail-filled bulletins. Write ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada: *Joy Manufacturing Company, (Canada) Limited, Galt, Ontario*

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SINCE 1851—OVER A HUNDRED YEARS OF ENGINEERING LEADERSHIP

FOUNDRY DEVELOPMENTS

By EDWIN BREMER

Metallurgical Editor

MULTIPLE molding method developed by Ford Co., Dagenham, England, uses resin-bonded sand instead of green or core sand. As described in Sept. 2 issue of *Foundry Trade Journal* (London) the process is used for making pearlitic malleable rocker arms. It employs pattern boxes heated to 200°C (392° F) which are filled with resin-sand mix (3½ per cent resin). Patterns form upper half of cavity of resulting casting. Through use of a frame or mask ⅛-in. thick the sand extends ⅛-in. above the top of the box.

The box is placed beneath a press, a hot top plate containing patterns to form remainders of the cavities in the cope side of the mold or core is set in position, and subjected to a pressure of 120 psi for 10 seconds. Pressure is removed, and the pattern box with top plate is sent through a tunnel-type electrically heated oven at a temperature of 600°C (1112°F) in 2 minutes. Top plate then is stripped from the pattern box, followed by ejection of the sand mold or core from the box by spring-loaded pins located in the bottom of the pattern box. Mold or core is set aside to cool. Each core contains 14 impressions, and 20 are stacked together to produce 280 castings.

* * *

CAST-to-shape tool and stainless steels are finding a growing market in the glass industry, according to Jessop Steel Co., Washington, Pa. One of the applications is the use of cast-to-shape stainless molds and plungers for manufacture of television tubes to provide improved, clear reception. To provide better tubes, Jessop in co-operation with two large glass companies developed a process of chilling the plungers and molds to produce sound structures free from pinhole porosity which can be polished to an extremely high degree. With chilling it is said that the structure can be controlled to a depth of 1½ in.

* * *

DISCUSSING design considerations for shell molding, S. B. Donner, Cooper Alloy Foundry Co., Hillside, N. J., pointed out that basic tenets of good steel casting design apply to shell molding in equal degree as for sand molding. This is despite early claims which credited the technique with certain properties by which metal solidification rates could be controlled. As in sand practice, abrupt changes in section, sharp corners and heavy T-sections must be avoided, minimized or streamlined to negate shrinkage and tearing. Principles of controlled directional metal solidification should be used in exactly the same manner as for sand. Application of these principles is especially critical for shell castings since the method possesses some very real limitations as well as advantages not common to sand practice. For example, except for a very limited use, internal or external chills cannot be utilized to equalize solidification rates in unequal metal sections due to mechanical nature of the mold forming process. Similarly, risers and feed heads cannot always be located with the freedom and choice common in sand molds.

* * *

RUBBER corebox patterns suitable for heavy production of close-tolerance investment plaster molds now are being made from a fluid compound cast at room temperature which sets to rubber without heat. Compound is based on a liquid polymer manufactured by the Thiokol Chemical Corp., Trenton, N. J. Polymer is a 100 per cent curable liquid which sets to a resilient rubber with extremely low shrinkage. It reproduces all details of the master pattern, and resulting rubber pattern is dimensionally stable. The rubber pattern also possesses ability to absorb stresses developed in pouring and setting of plaster molds to permit reproduction of complex patterns in a simple manner.

* * *

FOLLOWING two years' study, workers in General Motors Research Laboratories, in co-operation with those of the GM Allison Division, have come up with some developments which assist railroads in eliminating journal bearing failures or "hot boxes." One is to employ additives in the oil which are compatible with the usual journal bearing of bronze with a lead-babbitt lining. The other is substitution of an aluminum alloy bearing for the bronze. Three types of the latter have been developed, and further testing has been undertaken by Allison.

* * *

QUALITY Control Department of Allision Division, General Motors Corp., Bedford, Ind., has installed the world's first precision instrument which simultaneously applies ultrasonics and digital automation to parts inspection. Instrument was developed by Sperry Products Inc., Danbury, Conn., and includes a scanning machine, recorder, control cabinet and electronic console, which also is a monitoring station. Installed specifically for inspection of jet engine rotors and other unfinished engine parts, the unit completely scans the part mounted on a rotating turntable immersed in water. The instrument beams ultrasonic waves into the part undergoing inspection, and waves reflected by structural discontinuities are logged on a circular chart which becomes a record to aid interpretation and filing.

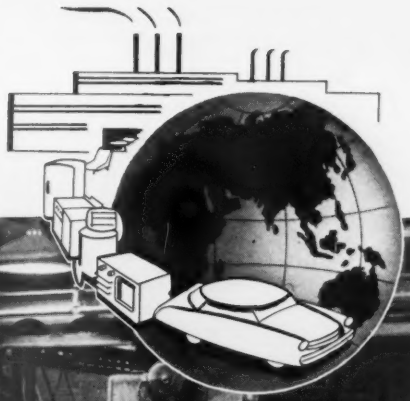
* * *

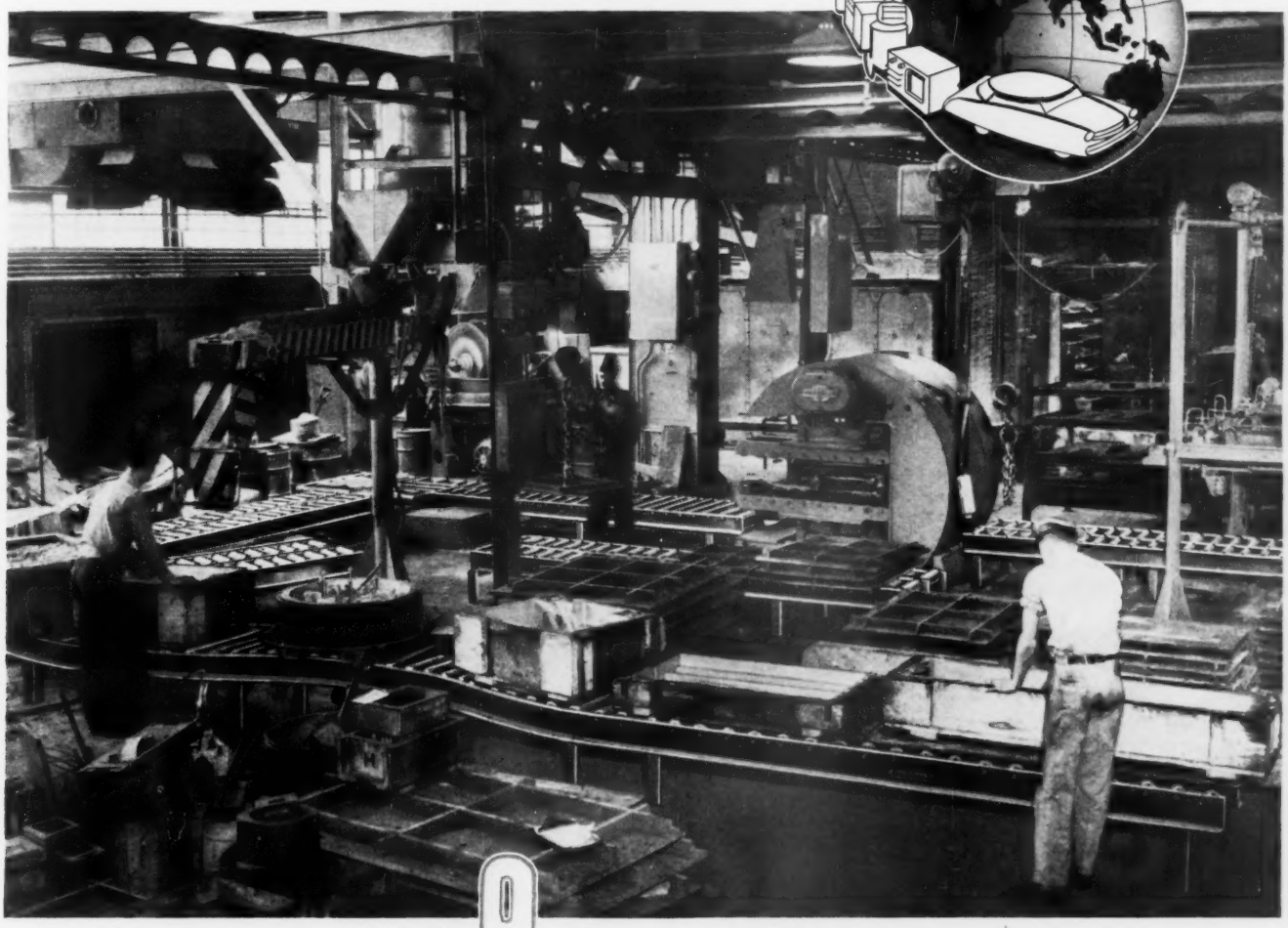
APPLICATION of high-temperature ceramic coatings to low-alloy steel parts such as combustion liners and collector rings for the J-47 jet engine has resulted in increasing the life span from three to five times. Developed by Bettinger Corp., Waltham, Mass., the procedure consists of a coating of high-temperature ceramic 0.001 to 0.002-in. on both sides of the steel part. Coating resists corroding gases and withstands operating temperatures up to 2200°F. Firm presently is engaged in research to extend its production knowledge to other fields where high operating temperature and corrosion are limiting factors in the life of machine parts.

* * *

CALCIUM boride is assuming a growing importance as a metallurgical chemical, according to Electro Refractories & Abrasives Corp., Buffalo. It reports sales 25 per cent over last year's figures to date. Supplied in grain form for deoxidizing copper and copper-base alloys, the firm foresees wide use in the steel industry as an economical source for the element boron.

How AMERICA OUT-PRODUCES THE WORLD





No. 9 OF A SERIES

"Logan Roller Conveyor system handling core boxes and finished cores. Customer reports worker fatigue eliminated, increased output from core room and fewer damaged cores."

AMERICAN INDUSTRY "Knows the value of time"

Doing the same work in less time is just as desirable as doing the same work with less effort. The American foundryman realizes this. He knows a job costs less to produce when it goes through the foundry in quick-time, and it means better service to the customer as well.

In many foundries Logan Conveyors eliminate the go-and-get and the fetch-and-carry duties of slow hand-handling. With Logan equipment along moulding and pouring lines, and through machining, each hour can be filled with sixty productive minutes.

Remember too, you get that "something extra" in engineering and design when you specify Logan Conveyors. Write today for literature, or for engineer to call.

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HAUSFELD
METAL MELTING FURNACES
FOR
BRASS—ALUMINUM—MAGNESIUM
AND ALL OTHER NON-FERROUS
METALS AND ALLOYS
GAS OR OIL FUELS

TILTING AND NON-TILTING TYPES
SINGLE AND MULTIPLE BURNERS
AUTOMATIC PROPORTIONING SINGLE VALVE
CONTROL ASSURES UNIFORM RESULTS WITH
MAXIMUM ECONOMY OF OPERATION.

The Campbell-Hausfeld Co.
300-320 MOORE ST. HARRISON, OHIO

Albion Malleable Host At Society Meeting

Albion Malleable Iron Co., Albion, Mich., was host to the Malleable Founders' Society at the latter's general industry meeting, Sept. 17. About 100 representatives of member companies attended. The morning was spent in inspecting operations at Albion's modern, mechanized foundry.

Following lunch at nearby Marshall, Mich., a brief business meeting was held. A feature of this session was a report of the society's Safety Subcommittee by its chairman, Norman N. Amrhein, Federal Malleable Co., West Allis, Wis. This report showed that malleable foundries reduced their accident frequency rate from 32.1 in 1951 to 21.6 in 1953. This reduction was greater than that experienced by industry as a whole, although the 1953 frequency for the latter of 13.7 still is lower than that of malleable foundries. The foundry rate for the first half of 1954 was cut further to about one-half that of 1951.

It was also announced that the society is sponsoring a second contest among employees of member companies for the best letter on "Accident Prevention." The contest closes Nov. 30, and four cash prizes totaling $250 will be awarded the winners.

FEF Publishes 1954 Yearbook

Reports and listings formerly sent out as separate listings are consolidated in the 1954 yearbook of the Foundry Educational Foundation, Terminal Tower Bldg., Cleveland. Included in the booklet is a progress report of the foundation since 1947, statement of policies and practices, listing of the officers and trustees, listing of members of the advisory committees at each member school and a membership directory.

Prints Supply Directory

Foundry Trades' Equipment & Supplies Association, 94-98 Petty France, London S. W. 1, has published a 100-page booklet, *British Foundry Plant and Supplies*, listing alphabetically the equipment and supplies needed by the foundry industry and which are available from the members of the association. Several pages of informative foundry data also are included as well as a wide range of advertisements. Booklet is available free by writing to London.

Pouring . . .

FASTER, EASIER WITH CLEVELAND TRAMRAIL

If you are thinking about tomorrow, you are giving serious thought to various ways of improving your foundry efficiency, speeding production and cutting costs. You will find Cleveland Tramrail of profound interest because, for the cost involved, there perhaps is no other important foundry equipment that will yield as profitable returns.

Pouring is just one example. Metal is tapped into a ladle on a tramrail carrier at the cupola. The ladle is then taken directly to the mold and poured. No rehandling. No spillage. No hard work. The crane or carrier rides freely and easily on the smooth overhead track.

Cleveland Tramrail equipment permits taking the ladle over the shortest route from cupola to mold without hindrance from floor obstacles. The metal is delivered with minimum heat loss.

Likewise in the handling of cores, sand, molds and castings are important economies and advantages possible with Cleveland Tramrail. Hundreds of installations in small and large foundries attest to the soundness of the overhead method of materials handling.

Our sales engineers will be glad to survey your needs. Their ideas may spell the difference between profit and loss in the coming period.

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OVERHEAD MATERIALS HANDLING EQUIPMENT

AFS PREPARES TENTATIVE SCHEDULE

For 1954 Convention in Houston

A TENTATIVE schedule has been prepared for the 59th annual convention of the American Foundrymen's Society which will be held in Houston, Tex., next May 23-27. Times and dates of certain functions scheduled for the week still are subject to change.

The Light Metals Division has been assured that the Aircraft Industries Association will be represented by at least one paper, for the first time. A paper on side frame and bolster castings probably will be presented in the Steel Division on behalf of the Association of American Railroads.

A proposed symposium on nondestructive testing is to feature a paper on experimental stress analysis as a means for recapturing lost casting business and developing new outlets for castings. Exchange papers have been promised by the Institute of Australian Foundrymen, the Institute of British Foundrymen and by a Swiss group.

The tentative program follows:

Monday, May 23

9 a.m. Registration opens
10 a.m. Technical sessions: Brass & Bronze—Malleable
12 noon Roundtable luncheon: Malleable—Brass & Bronze
2 p.m. Technical Sessions: Brass & Bronze—Light Metals—Malleable—Sand
4 p.m. Technical sessions: Brass & Bronze Shop Course—Light Metals—Malleable Shop Course (Pearlitic Malleable)
8 p.m. Shop course: Sand—Gray Iron

Tuesday, May 24

8:30 a.m. Registration opens.
9:30 a.m. Technical sessions: Brass & Bronze—Light Metals—Industrial Engineering—Education—Sand
12 noon Roundtable luncheons: Light Metals—Education
2 p.m. Technical sessions: Safety, Hygiene & Air Pollution—Industrial Engineering—Sand—Malleable
4 p.m. Technical sessions: Brass & Bronze Shop Course—Malleable Shop Course (Hot Tearing)—Safety, Hygiene & Air Pollution—Light Metals
6 p.m. Sand Division Dinner
8 p.m. Shop Course: Sand—Gray Iron

Wednesday, May 25

8:30 a.m. Registration opens.
9:30 a.m. Annual business meeting
10:15 a.m. Charles Edgar Hoyt Annual Lecture
12 noon Roundtable Luncheon: Pattern—Gray Iron
2 p.m. Technical sessions: Refractories—Sand—Steel—Light Metals
4 p.m. Gray Iron—Plant & Plant Equipment—Safety, Hygiene & Air Pollution—Pattern—Heat Transfer
7 p.m. AFS Annual Banquet

Thursday, May 26

8:30 a.m. Registration opens.
9:30 a.m. Technical sessions: Gray Iron—Sand—Steel
12 noon Steel roundtable luncheon
2 p.m. Technical sessions: Sand—Gray Iron—Refractories— Safety, Hygiene & Air Pollution—Cost
4 p.m. Technical sessions: Gray Iron—Sand—Heat Transfer
7 p.m. Texas Chapter Night

Friday, May 27

8:30 a.m. Registration opens.
9:30 a.m. Technical sessions: Gray Iron—Sand—Steel
2 p.m. Symposium on Non-destructive Testing

Standard Super Duty Snagging Grinder Speeds-up Casting Output At Aluminum Industries, Inc.
HIGH PRODUCTION IN ACTION
Sliding down twin chutes, cast aluminum pistons at Cincinnati, Ohio, plant get fast rough-grinding at one of two independent work stations.
Differing work loads for each side wear wheels to different diameters, but both wheels on this Type 55 Grinder operate at their separate correct peripheral speeds.
Standard Type 55 Super Duty Snagging Grinders come in sizes up to 100 hp with 20" to 30" wheels.
For complete information write for Catalog.
FOUNDRY GRINDER DIVISION
the STANDARD electrical tool co.
MACHINE TOOLS
2507 RIVER ROAD • CINCINNATI 4 • OHIO

Reynolds Issues New Book

Reynolds Metals Co. has just issued the 1954 edition of "The Aluminum Data Book." The new book includes in its 220 pages detailed data on the properties and characteristics of aluminum, made easily available by a table of contents, an index of tabular matter and an itemized cross index.

A section of the book discusses aluminum casting alloys, including details on casting methods, foundry practices with definitions of seventeen aluminum pig and ingot products used in the foundry. A section of tables completes the book. The manual, ring-bound to lie flat when open, will be sent without charge to any engineer, designer, technical man, instructor or executive who requests it on company letterhead. To all others the price is $1.00. Requests may be addressed to Reynolds Metals Co., Desk PR, 2500 South Third St., Louisville 1, Ky.

Announcing

2 new RCI

liquid phenolic resins

for blowing shells and cores...

FOUNDREZ 7429

and

FOUNDREZ 7581

RCI's new, liquid, water-soluble, phenolic resin — FOUNDREZ 7429 — is just the thing for turning out top-quality shell molds without using costly special equipment. With FOUNDREZ 7429, you save ½-⅓ the cost of overall shell mold production . . . because you work with a conventional blowing machine and 50-75% *less* resin. Yet you get shells that equal or surpass in smoothness and dimensional accuracy those produced by the Croning process.

Reichhold's other new, liquid, water-soluble, phenolic resin — FOUNDREZ 7581 — has a number of advantages over core oils for blowing cores.

Most important, it *speeds production* . . . a big saving, as labor makes up about 35-40% of the total cost of the average finished casting. With FOUNDREZ 7581, your curing cycle is cut from hours to minutes . . . your cores come out almost "pattern-smooth," so there's usually no need for hand filing, mudding or core washing operations. Gassing is reduced, too, as cereal is eliminated in the binder.

For the whole story, write for Technical Bulletins F-6 (FOUNDREZ 7429) and F-5 (FOUNDREZ 7581).

REICHHOLD CHEMICALS, INC. | 525 NORTH BROADWAY, WHITE PLAINS, N.Y.

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Maleic Anhydride
Sodium Sulfate
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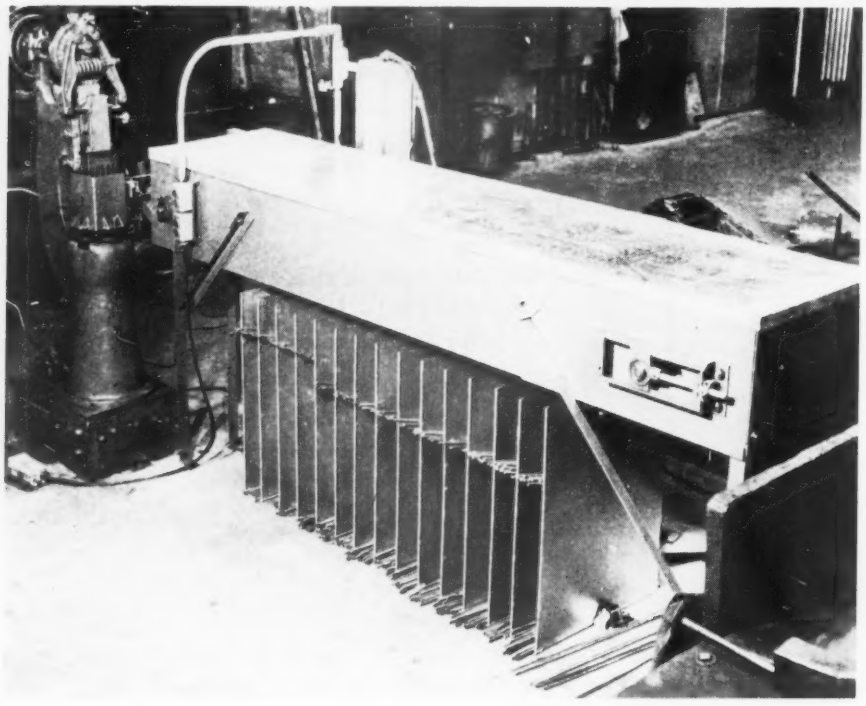
NEW EQUIPMENT AND SUPPLIES



Core Rod Straightener: Hydro-Blast Corp., 2550 North Western Ave., Chicago 47, Ill.—Automatic machine is said to straighten bent core rods, sort them according to length, and deliver the rod to its proper size bin for use by the coremaker. Bent rods are fed through a protected opening into a hammer-type mechanism equipped with serrated dies. Upper die drops on rod with rapid forge hammer action, straightens rod against lower serrated member, and ejects straightened rod. Rod then is gripped by rollers, passed over a ramp to a conveyor mechanism and carried to the proper size bin where it is stored. Manufacturer claims up to 1000 rods per hr have been straightened under actual working conditions.

For More Details Circle No. 1—Page 239

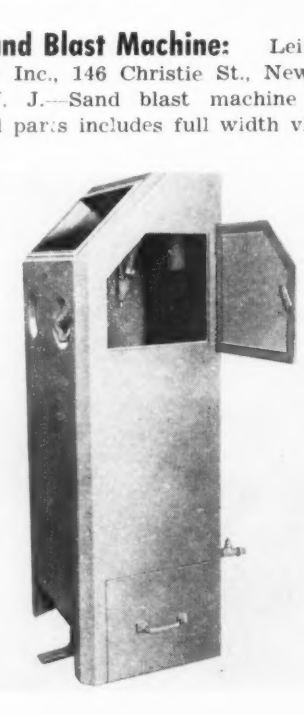
Flowability Test: Harry W. Dietert Co., 9330 Roselawn Ave., Detroit 4, Mich—Sand flowability test reportedly predicts the results of ramming into deep pockets. A slanting plate is inserted in a standard specimen tube to form the pocket. Comparative hardness of the sloping face at the side and narrow points gives the clue to flowability expressed in percentage. Auxiliary equipment consists of a standard rammer, specimen tube and green hardness tester.

For More Details Circle No. 2—Page 239

Motor Drive: Reeves Pulley Co., Columbus, Ind.—Fractional horsepower variable-speed motor drive is available in ¼, 1/3, ½ and ¾-hp sizes in speed ranges from 2:1 to 10:1. Redesign of the drive has resulted in smaller, more compact units which are available in 112 different assemblies to meet exact space requirements. Horizontal, vertical and 45 degree models, with vertical down output shafts, and speeds from 3 to 4660 rpm are available. Handwheel, extended handwheel, electric remote, and mechanical automatic controls can be supplied.

For More Details Circle No. 3—Page 239

Sand Blast Machine: Leiman Bros. Inc., 146 Christie St., Newark 5, N. J.—Sand blast machine for small parts includes full width viewing glass, enclosed cabinet, and movable nozzle suspended from top of cabinet. Three sizes are available: 18 x 24, 30 x 36, and 24 x 60 in. Larger sizes can be made to order. Machines can be supplied with automatic feed in gross quantities for small parts such as bolts and nuts.

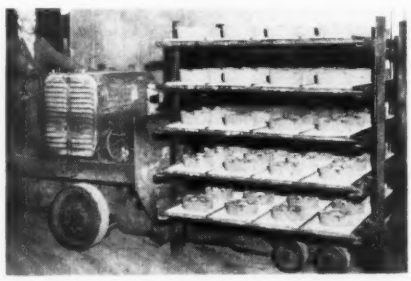


For More Details Circle No. 4—Page 239

Snow Plow Attachment: Prime-Mover Co., Muscatine, Iowa—Snow plow attachment is designed for quick and easy attachment to company's powered wheelbarrow. The 50-in. angling blade can be readily dropped off to permit the wheelbarrow to resume its normal materials handling operations. The unit's 10 cu ft bucket can be filled with ballast or sand or salt for spreading on icy areas.

For More Details Circle No. 5—Page 239

Platform Truck: Elwell-Parker Electric Co., 4205 St. Clair Ave., Cleveland 3, O.—Low lift platform truck is equipped with a slow speed lifting jack to cushion the shock of raising and lowering. Device is said to lessen the possibility of breaking or cracking fragile loads, such as green cores, during lifting operations or transportation between work stations.



For More Details Circle No. 6—Page 239

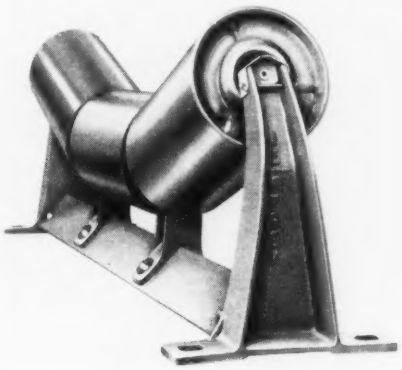
Lowhead Chain Hoist: Reading Crane & Hoist Corp., Reading, Pa.—Combined lowhead chain hoist and trolley is for use where there is close headroom and for short radius curves. Durability is secured through trucks of cast steel with ball bearing wheels running on hardened steel axles. Capacities are 1, 1½, and 2 ton.

For More Details Circle No. 7—Page 239

Conveyor Belt Cleaner: Stephens-Adamson Mfg. Co., Aurora, Ill.—Spring type conveyor belt cleaner is designed to remove material adhering to the belt after discharge. Material is scraped off by steel wiper blades perpendicular to the belt surface, but diagonal to its line of travel. Pressure of the wiper blades against the belt can be adjusted for different

operating conditions. Cleaner uses no moving parts and adjustable mounting brackets will fit any belt conveyor head pulley assembly.
For More Details Circle No. 8—Page 239

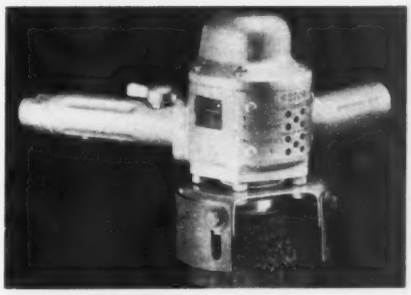
Belt Idlers: Jeffrey Mfg. Co., First Ave. & Fourth St., Columbus 16, O.—Series of belt idlers features dual flexible contact seals that are said to keep out dirt and retain grease. Idlers are factory packed, adjusted and sealed, to create a permanently lubricated idler. Additional



features are self-cleaning inverted angle base, die straightened malleable iron stands, mounting feet cast integrally with the end stands, balanced and streamlined design, high capacity tapered roller bearings, outer shields to protect double flexible shields, vented rolls for pressure balance, and plugs to prevent promiscuous greasing.
For More Details Circle No. 9—Page 239

Core Washes: Frederic B. Stevens Inc., 1800 18th St., Detroit 16, Mich.—Company has two new core washes. One, a fine, yellow-colored, carbon-free, dry powder type coating for cores and molds is said to be easily mixed with water and has excellent suspension from 40 degrees Baume up. According to the manufacturer, this core wash is versatile and has had successful application in steel, iron and nonferrous foundry operations. The other wash is a fine, graphite-base, dry powder type wash for iron and nonferrous use. It also is reported to have excellent suspension over a wide Baume range, and may be prepared to allow fast drying of the core coating.
For More Details Circle No. 10—Page 239

Vertical Grinder: Rotor Tool Co., 26300 Lakeland Blvd., Cleveland 23, O.—Lightweight vertical grinder for cup wheels, sanding pads and wire brushes weighs 6¾ lb and has an overall height of 7 in., including



spindle. Speeds from 4500 to 8000 rpm are controlled by governor threaded into rotor shaft. Dead handle is removable for one hand operation and live handle can be installed in any of four positions for operator's requirements. Automatic oiler and air strainer are built in.
For More Details Circle No. 11—Page 239

Galvanized Coating: Industrial Craftsmen Inc., 145 High St., Boston, Mass.—Zinc, resin vehicle coating, applied by brush, reportedly bonds to any iron or steel surface that is dry, free of grease and loose scale, and not painted with a tar or bituminous paint. Material is packed in quantities of 12 oz and up.
For More Details Circle No. 12—Page 239

Porosity Detector: Botsford Chemical Co., Botsford, Conn. — Porosity detector developed for use in nonferrous foundries reportedly will detect the presence of gases in molten aluminum prior to pouring. Detector employs the reduced pressure method of testing. The unit is compact, simple to operate, and weighs 40 lb for ease of movement around the foundry. It is supplied with crucibles for sampling, tongs, plug in cord, and operational instructions.
For More Details Circle No. 13—Page 239

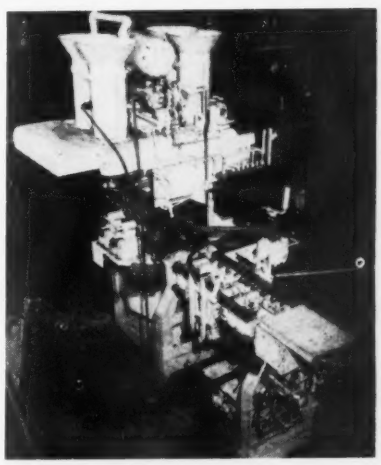
Hopper Dump Box: Union Metal Mfg. Co., Canton, O.—Hopper-front dump box is made from 12-gage corrugated steel and is designed for

compact tiering and roll over dumping. Contents of stacked boxes remain accessible through hopper front. Fork slots on both sides provide for ease of handling and safe roll-over dumping. Two double-locking tiering

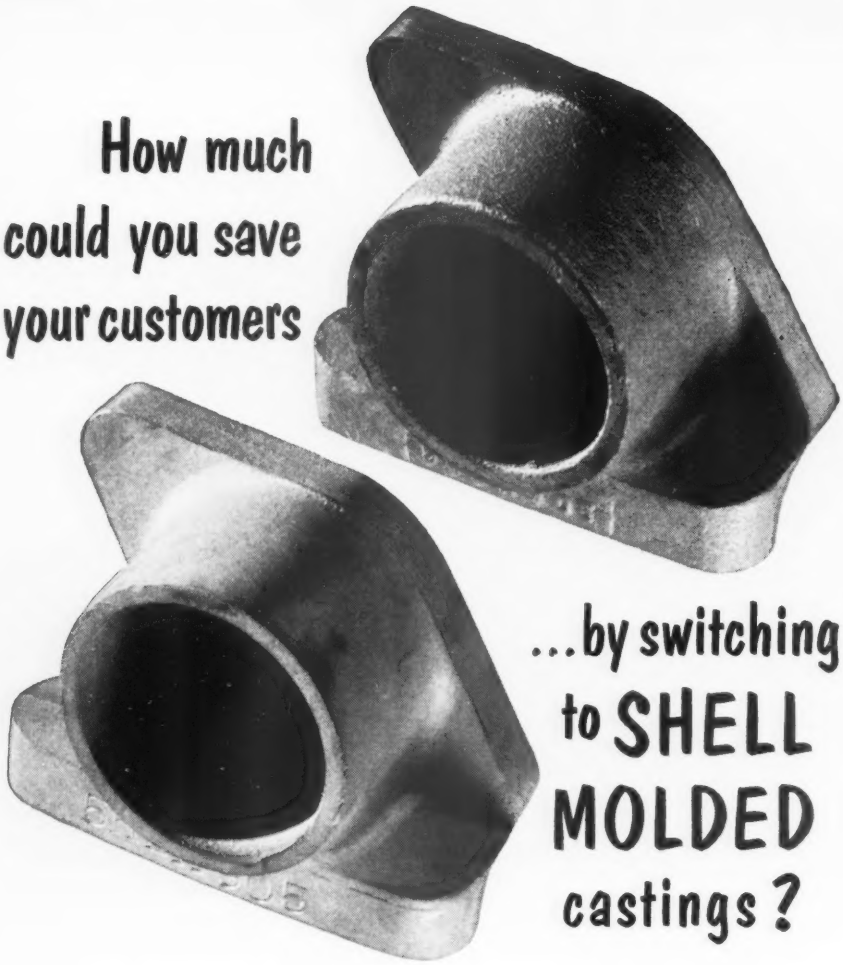
Core Machine Completes 4 Cycles Per Minute

AUTOMATIC core machine combines a high-speed trunnion-type core rollover and draw machine with company's core blower. The trunnion rollover handles two coreboxes on a roller-equipped frame that rotates about a trunnion axis. As one box is rolled into the rollover device from the core blower, a blown core is drawn from the other box. Both boxes then are rolled over and as the top box automatically is indexed into the blower, clamped for blowing, blown, unclamped and automatically indexed back to the rollover device, a blown core is drawn from the lower box.

After rollover and draw, the completed cores are ejected and elevated to handling height. Total time cycle for the blowing, indexing, rollover, draw and elevation of a complete core to handling height is fifteen seconds. Thus



four complete cycles are made each minute. The unit is manufactured by Beardsley & Piper Division, Pettibone Mulliken Corp., 2424 North Cicero Ave., Chicago 39, Ill.
For More Details Circle No. 14—Page 239



How much could you save your customers ...by switching to SHELL MOLDED castings?

Many factors, including shape, size, metal, and number of castings required, all have a bearing on the economies possible with shell molding. These vary with the nature of the individual job.

Certain economies are basic, however. They are apparent in the contrast between these two typical castings, the upper being from green sand, the other shell molded. The almost pattern-smooth surfaces of the shell molded piece, the fine detail and clean, sharp edges result in substantial savings in machining and finishing. Often these costly operations are eliminated entirely!

Continuing research on a practical scale in connection with Durez foundry resins has produced a fund of information that can help to answer questions in advance. We will gladly share the results of our experience with you. Just write, telling us all you can about what you wish to know.

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- Fewer Rejects
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angles at both corners and a reinforcing bar across the open front insure safe tiering.

For More Details Circle No. 15—Page 239

LPG Fork Lift Truck: Clark Equipment Co., Industrial Truck Division, Battle Creek 16, Mich. — Standard model fork lift trucks in 3000 - 5000 lb capacities can now be powered by liquefied petroleum gas (LPG). Installation of a compact, field tested fuel unit and relatively minor engine changes adapt the gasoline-powered fork truck for LPG. As liquefied petroleum is a dry gas, there is no liquid to dilute the cylinder lubricant or crankcase oil. The claimed result is

less wear on cylinder walls and bearings and longer life for the lubricating oil. Engine operates at an 8 to 1 compression ratio. Stellite-faced valves and seats and positive valve rotators are used because of the petroleum's high flame temperature.

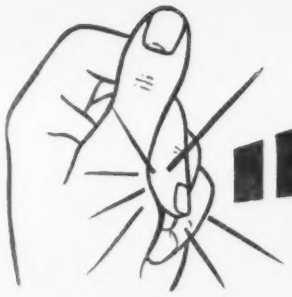
For More Details Circle No. 16—Page 239

Moisture Trap: V. D. Anderson Co., 1935 West 96th St., Cleveland 2, O.—Float-type moisture trap drains moisture and condensate continuously and automatically from piping systems, purifiers and other equipment which handle air, gas, or steam. Traps are suitable for operating pressures up to 200 psig and feature an optional inlet for ease of installation. Unit consists of a stainless steel valve and seat, lever and a copper hide float inside a semisteel case. Stainless steel float can be furnished. Traps with ½ and ¾-in. connections can be supplied.

For More Details Circle No. 17—Page 239

Abrasive Wheels: Metal Removal Co., 1546 North Orleans, Chicago 10, Ill.—Regular hard resin grinding wheels have been reinforced to take extreme peripheral as well as side bending or wedging stresses. Wheels are made in thick-

(*Continued on page* 241)



IDEAS FOR FOUNDRYMEN

HERE ARE QUICK REVIEWS OF NEW LITERATURE—available to foundrymen as "idea" and reference information. Readers in the United States and Canada may obtain copies by using the attached cards. Readers in foreign countries should write direct to the manufacturer offering literature.

81. Electric Furnace Control

Whiting Corp., Harvey, Ill.—A short history of electric furnace control and the latest development in this field are described in bulletin FO-10, "The Whiting Hydro-Arc Furnace Control." A feature of the new control is the elimination of special differential field rotary generators. Advantages of the control also are described.

82. Space Heaters

Dravo Corp., 1203 Dravo Bldg., Pittsburgh 22, Pa.—Warm air, oil and gas-fired space heaters, designed specifically for commercial and industrial establishments, are pictured in bulletin 552. Design and construction features, application and installation information and engineering data are given for 200,000 and 250,000 Btu per hour capacity heaters.

83. Grinding Wheel Catalog

Norton Co., Worcester 6, Mass.—Wheel specifications, grinding wheel selection and a supplement of net prices are features of catalog 1052. The illustrated booklet, "Grinding Wheels," includes cross-sectional diagrams of wheels and mounted points.

84. Aluminum Bottom Boards

R & J Foundry Co., 610 South 94th St., Milwaukee 14, Wis.—Illustrations, applications and advantages of aluminum bottom boards are given in leaflet.

85. Paints

Flexrock Co., 3604-Q Filbert St., Philadelphia 1, Pa.—Paints for use in metalworking plants are described in a new catalog.

86. Gasoline Tractor

Mercury Mfg. Co., 4044 South Halsted St., Chicago 9, Ill.—Performance features and detailed specifications of new four-wheel tractors are described in two bulletins. T-101 covers the standard model with a 2400-lb draw bar pull and T-102 the heavy-duty model with a draw bar rating of 3000 lb.

87. Hoist Controller

Cutler-Hammer Inc., 244 North 12th St., Milwaukee 1, Wis.—Publication EC-165 describes a hoist controller used with wound rotor motors. It combines characteristics of the eddy-current load brake and the regulating magnetic amplifier to obtain speed-torque curves previously unavailable on alternating current hoists.

88. Shell Core Machine

Shalco Engineering Corp., P.O. Box 208, 81 Encina Ave., Palo Alto, Calif. —Leaflet describes a shell core machine for the production of cores used in green sand molds, permanent molds and shell molds. Illustrations of the machine and cores are included.

89. Portable Hardness Tester

Barber-Colman Co., Rockford, Ill. —Data on a portable hardness tester for aluminum, aluminum alloys, copper and other materials is presented in brochure F 1689-2. A conversion graph gives Rockwell E, F, H, Vickers and brinell numbers.

90. Thermocouple Wire

Claud S. Gordon Co., 3000 South Wallace St., Chicago 16, Ill.—Sizes, metals, insulations, application data and prices of thermocouple and extension wire are given in bulletin 1200.

91. Cylinders

Miller Fluid Power Co., 2040 North Hawthorne Ave., Melrose Park, Ill. New pamphlet entitled "A Cylinder Program for Automation and Heavy

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Duty Service" highlights standardization of critical cylinder mounting dimensions and stroke lengths. Drawings and tables show the degree of standardization between various cylinder manufacturers.

92. Unit Heaters

American Blower Corp. Div., American Radiator & Standard Sanitary Corp., Detroit 32, Mich.—Features of design, general engineering data, capacity tables and piping diagrams for unit heaters are given for steam and hot water applications. Illustrations and schematic diagrams also are included in bulletin 7517.

93. Bulk Pneumatic Handling

Fuller Co., Catasauqua, Pa.—How handling costs can be reduced by using the proper pneumatic handling system is told in bulletin G-2. The 16-page bulletin covers conveyor systems, rotary compressors, a clinker cooler and a kiln preheater.

94. Rust Remover

Turco Products Inc., 6135 S. Central Ave., Los Angeles 1, Calif.—New liquid alkaline rust removing material that is said to remove simultaneously paint, rust and primer from ferrous metal surfaces is described in an illustrated four-page brochure.

95. Foundry Shakeouts

Hewitt - Robins Inc., Stamford, Conn.—Bulletin 124C describes foundry shakeouts and allied foundry equipment. Amply illustrated with pictures of typical installations, the bulletin provides full technical details and dimensions.

96. Small Scoop Loader

Jaeger Machine Co., 550 W. Spring St., Columbus 16, O.—A 12-cu-ft scoop loader is shown performing typical foundry operations in illustrated folder. Turning radius and scoop position information is included.

97. Facts About Zirconium

Carborundum Metals Co., Akron, N. Y.—Information about the history and production of zirconium is given in a 64-page booklet. The mechanical and physical properties, chemical properties and facts about fabrication are included.

98. Valves

Ross Operating Valve Co., 107 East Golden Gate Ave.. Detroit 3, Mich.—Hand, foot, cam, solenoid operated valves (both direct and pilot controlled) and valves for remote controlled operation are described and illustrated in a 118-page catalog. An exploded view of each valve is given in catalog 53.

99. Glossary of Terms

International Nickel Co., 67 Wall St., New York 5, N. Y.—Over 150 technical terms used by both suppliers and users of castings are explained in a 36-page booklet.

100. Monorail Equipment

American MonoRail Co., 13104 Athens Ave., Cleveland 7, O.—File No. F-2 includes 28 reports on the engineered application of monorail equipment. Each report is illustrated.

101. Molding Machine

International Molding Machine Co., La Grange Park, Ill.—Leaflet gives machine and operating dimensions of a jolt, squeeze, rollover, draw machine.

102. Industrial Lubricants

Gredag Inc., Niagara Falls, N. Y.—Lubricants for a variety of uses and operating conditions are listed in a four-page bulletin. Grade and consistency are given for each lubricant.

103. Finishing Ovens

Michigan Oven Co., 415 Brainard, Detroit 1, Mich.—Important features of finishing systems for baking and drying all types of industrial equipment are given in a new brochure.

IMPORTANT READING FOR FOUNDRYMEN

We have a limited quantity of the following reprints which we can furnish while they last.

104. Foundry Modernization

Reprint of an article "Modernization Without Mechanization" by Lester B. Knight which was presented before the 1951 International Foundry Congress in Brussels. Author tells how malleable and gray iron castings are made at Dalton Foundries Inc., pointing out that various operations can be modernized without complete mechanization.

105. Shell Molding

Shell molding development work in International Harvester's research foundry is covered in "Shell Molding," compiled from two FOUNDRY articles. Equipment requirements for both relatively large production setups and experimental work are outlined. Types of shell making machines available and a production layout are included.

106. Nonferrous Pyrometry

Reprints of two articles by Robert A. Colton in which he describes the various influences of temperature control on the properties of nonferrous castings and discusses various types of pyrometers with recommendations being made for their care and use.

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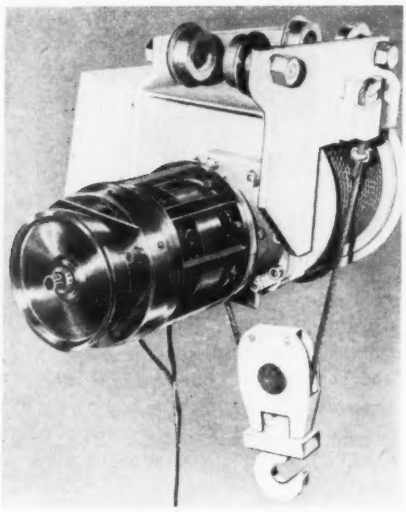
(*Continued from page* 238)

nesses of ⅛ to 1 in. and 3 to 12-in. diam. Wheels also are available in 7 and 9 in. diameters as depressed center discs in ⅛, 3/16, ¼, and ⅜-in. thicknesses for use on right hand grinders.

For More Details Circle No. 18—Page 239

Heavy Duty Hoists: R. G. LeTourneau Inc., Longview, Tex.—Company has added to its line a series of overhead materials handling electric hoists that have capacities upward from 4 tons, with special attention given to applications requiring lifts of over 15 tons. Standard 4, 5 and 6-ton models have wire rope lift, with swivel hook suspended on a two-part line. Hoists are all-steel, welded construction with electrical components protected for outdoor,



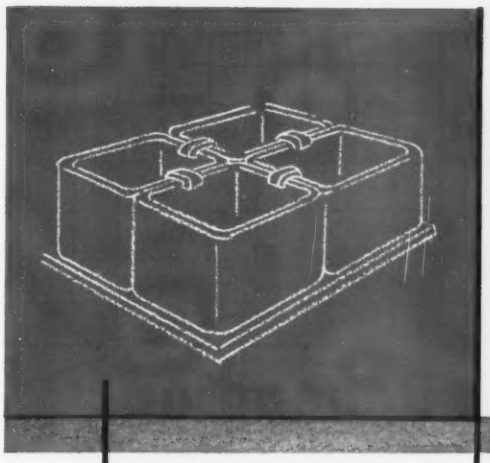
year-round operation. Suspension is by lug, hook, plain or geared trolley. Motors are single-speed, reversible squirrel cage induction type with their rotor circuits completed outside the stator windings. Motors operate on three-phase 220 or 440-v ac.

For More Details Circle No. 19—Page 239

Roof Maintenance: Lexsuco Inc., 4815 Lexington Ave., Cleveland 3, O.—Company is supplying roof maintenance materials and tools in package units. The package system has been developed to eliminate guesswork computations of materials and tools needed for roof maintenance, simplify the purchase of materials and tools and reduce waste of materials. One package is for complete roof resurfacing, the other for roof repairs.

For More Details Circle No. 20—Page 239

Dual Fuel Burners: North American Mfg. Co., 4455 East 71st St., Cleveland 5, O.—Line of dual fuel burners suitable for general use on all types of furnaces will operate under a wide variety of conditions on



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In a batch furnace, the entire work load is positioned inside the chamber and is removed after the heat treat cycle has been completed. Batch furnace may have several stock handling methods: tray, car, cover, elevator, pit, and tumbling barrel depending on the type of stock treated.

Just as great a variety of stock handling methods pop up when furnaces are continuous, that is where successive loads parade through heat treat cycle. You will find a complete description of all types of continuous furnaces and their methods of handling stock in Holcroft's book—Blazing the Heat Treat Trail. You can have a copy if you write today. Holcroft & Company, 6545 Epworth Blvd., Detroit 10, Mich.

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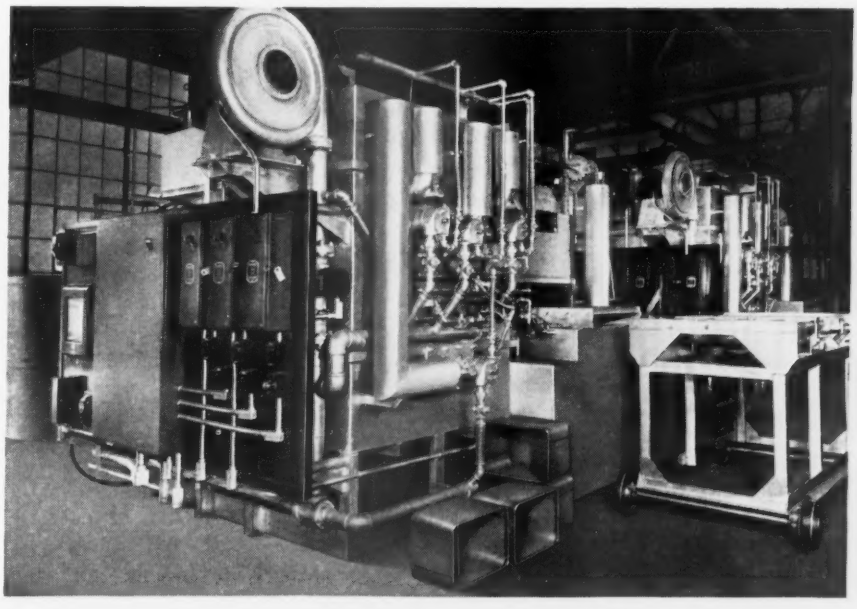

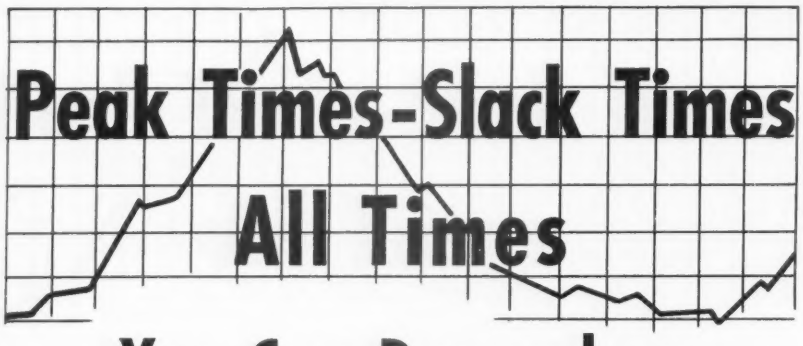

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heavy oil, light oil, or gas. Three sizes having 4, 6 and 8-in. main air connections are now available, with smaller and larger sizes being developed. Main air can be supplied at any pressure up to 16 psi at the burner. Main air capacities at 16 psi are 24,000, 70,200, and 146,000 cfh, respectively.

For More Details Circle No. 21—Page 239

Lifting Magnet: Ohio Electric Mfg. Co., 5400 Dunham Rd., Maple Heights, Cleveland, O. — Self-contained, battery operated lifting magnet is designed for in-plant use. It eliminates the hazards of power supply failure from power mains. Unit weighs 120 lb, including batteries, and can be used on lift trucks and shop hoists. Magnetizing surface is 7½ x 12 in. Under normal operating conditions, batteries last from five to twelve 8-hr work shifts without recharging. Magnet will lift loads to 2000 lb.

For More Details Circle No. 22—Page 239

Abrasive Grain: Abrasive Products Co., Lansdowne, Pa.—Abrasive grain prepared by a process claimed to provide additional heat annealing and milling is said to be unusually tough and sharp for roughing, surfacing, tumbling, wet or dry blasting, and other abrasive operations. The abrasive is available in 21 grit sizes ranging from 10 to 240.

For More Details Circle No. 23—Page 239

Micrometer: L. S. Starrett Co., Athol, Mass.—Micrometer reads direct in ten-thousands of an inch with no vernier to decipher. When using the micrometer conventionally, the measuring faces are brought up snug to the piece being measured, and then loaded by continuing to rotate the outer thimble through about nine to ten divisions. Outer thimble returns under spring tension until the 0.001-

graduation on the inner thimble lines up with the reading line on the sleeve. The 0.0001-reading is taken directly from the outer sleeve. Accuracy throughout the range of the micrometer is claimed to be within 0.00005-in. Range is 0 to 1 in.

For More Details Circle No. 24—Page 239

Electrodes: Pacific Welding Alloys Mfg. Co., 310 North Avenue 21, Los Angeles 31, Calif.—Excellent weldability and fast, high-tensile build-up of hard-to-handle alloy and cast steels are claimed for a welding electrode which is a conglomerate alloy containing carbon, manganese, chrome, nickel, molybdenum and vanadium, with a low hydrogen type coating. Electrode deposits have a Rockwell C hardness of 28-30 and can be heat treated for desired hardness and physical properties. Electrodes can be supplied in ¼, 7/32, 3/16, 5/32, and ⅛-in. sizes.

For More Details Circle No. 25—Page 239

Materials Handling Box: Chas. Wm. Doepke Mfg. Co., 8839 Blue Ash Rd., Rossmoyne, O.—All-welded 14-gage steel materials handling box is designed to meet a demand for a box midway between a tote box and a heavy corrugated bin-type container. Units are 36 in. long x 16½ in. wide x 14 in. high. When filled, each unit rests on the upraised

handles or bails of the box below. Contents remain fully visible and accessible. Boxes can be used in conjunction with powered belt, overhead, wheel and roller conveyors, as well as lift trucks. Other boxes of similar design and construction are available in sizes from 12 in. long and larger to fit other materials handling requirements.

For More Details Circle No. 26—Page 239

Front End Loader: Tractomotive Corp., Deerfield, Ill.—Four-wheel drive rubber-tired front end loader weighs about 12,000 lb and has a 1-cu-yd bucket. The unit is equipped with rear wheel power steering, a clutch type transmission with four speeds in each direction, and a torque converter drive with a three-

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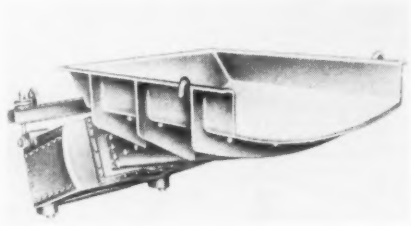
to-one torque multiplication ratio. Ground clearance is 15 in. Machine has a 62½-in. tread on both front and rear wheels with overall width of 86 in. Clearance under bucket cutting edge when it is dumped at maximum raise is 8 ft. Reach from bucket cutting edge to the forward most point of machine at 8 ft dumping clearance is 2 ft 4 in.; at a 7-ft dumping clearance it is 3 ft 3½ in.
For More Details Circle No. 27—Page 239

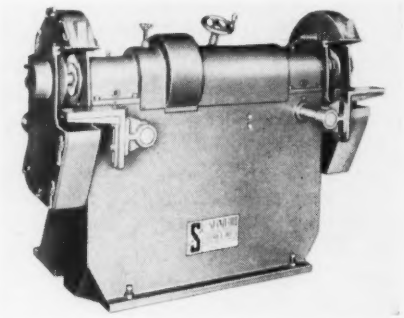
Vibratory Feeder: Syntron Co., Lexington Ave., Homer City, Pa.—Heavy tonnage vibratory feeder equipped with a 54 x 72-in. flat pan trough has a maximum feeding capacity of 750 tons per hour of bulk materials. Electromagnetic principle eliminates gears, belts, idlers, and eccentrics and produces 3600 conveying vibrations per minute from 220 or 440 v, 60 cycle, ac. A dial switch controls the rate of material flow from the machine.



For More Details Circle No. 28—Page 239

Aluminum Electrode: Aluminum Co. of America, 1501 Alcoa Bldg., Pittsburgh 19, Pa.—Consumable electrode is for use in inert gas, shielded arc welding of aluminum by welding guns. Electrode can be used also for tungsten arc welding where filler wire is fed mechanically to the work. Three aluminum alloys, 2S, 3S, and A54S, are currently being produced. Following sizes are packaged: 0.030, 0.040, $\frac{3}{64}$, $\frac{1}{16}$, $\frac{3}{32}$, and $\frac{1}{8}$-in. diam. Mill quantity orders are available in sizes from 0.020 to $\frac{1}{8}$-in.
For More Details Circle No. 29—Page 239

Snagging Grinder: Standard Electrical Tool Co., 2507 River Rd., Cincinnati 4, O.—Double end variable speed snagging grinder accommodates two 20-in. diam x 3-in. face grinding wheels. Drive reportedly maintains a constant cutting speed throughout wheel life with simultaneous adjustment of the wheel guards for protection in relation to worn wheel diameters. Design for vitrified bond wheels will maintain 6500 sfpm while the arrangement for resinoid bond wheels will maintain 9500 sfpm throughout wheel life. Adjustable work rest at each wheel is supported by the base of the machine.

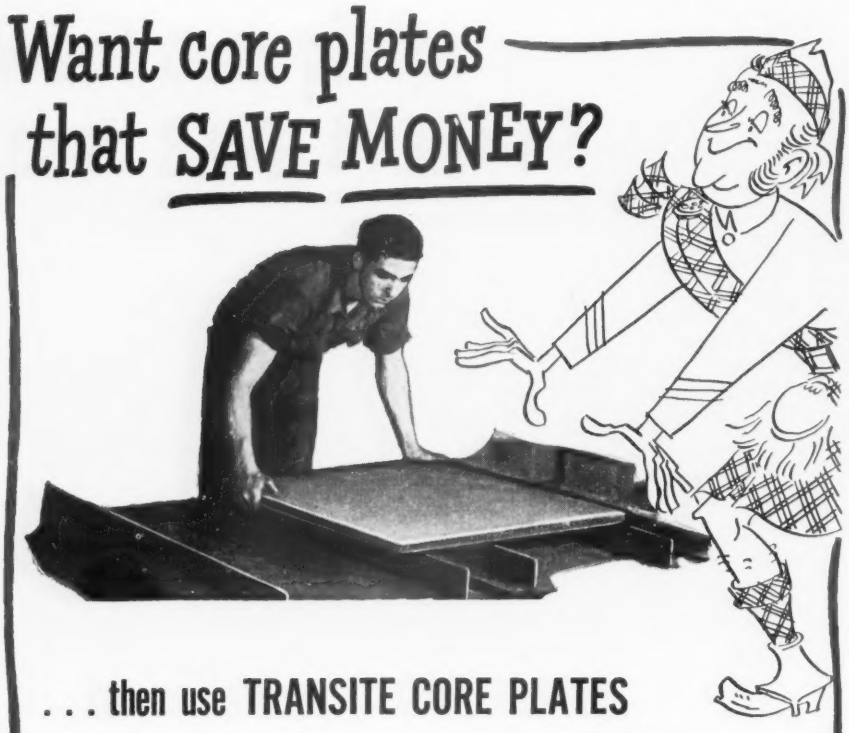


For More Details Circle No. 30—Page 239

Air Hose: Hamilton Rubber Mfg. Co., Trenton 3, N. J.—Rayon cord air hose is impregnated with rubber cement and braided under tension on steel mandrels. Cover is said to resist wear, abrasion, and extreme service conditions. Standard lengths are 50 ft. Sizes available are $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$, and 1-in. two braid. All sizes, except 1 in., will stand working pressures up to 300 psi. The 1 in. size will stand up to 250 psi.
For More Details Circle No. 31—Page 239

Pyrometer Test Unit: Sherman Electric Co., 1807 Elm Rd., N. E., Warren, O.—Electrical device is said to check faulty connections in thermo-
(*Continued on page* 246)

Want core plates that SAVE MONEY?



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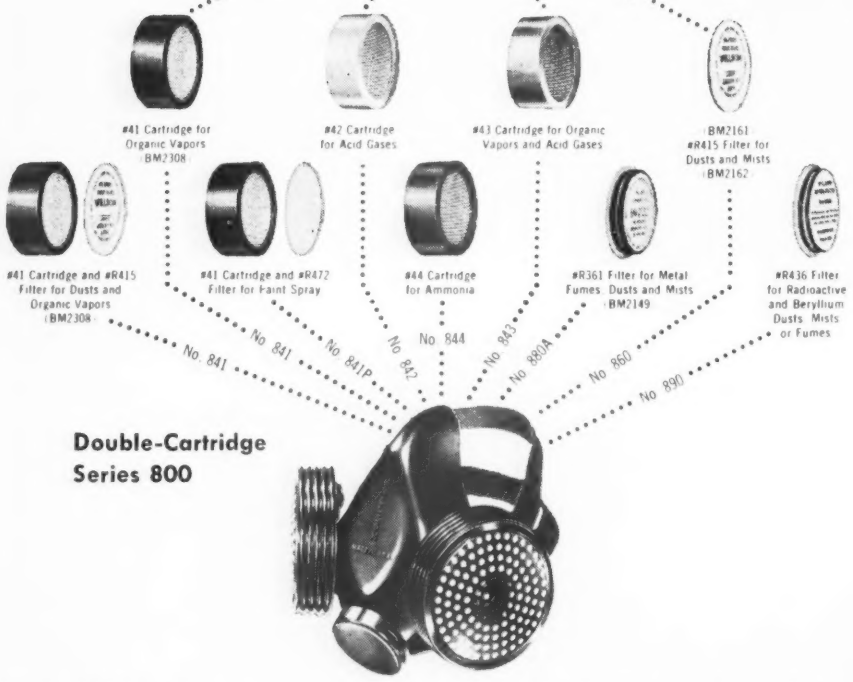
NOTE: The cartridges and filter shown for use in the Series 400 single-cartridge respirator are exactly the same as those used in the Series 800 double-cartridge respirator and can be used interchangeably in both. The other five cartridges, filters, and combinations are recommended for use only in the Series 800 respirator.


No. 441
No. 442
No. 443
No. 460
#41 Cartridge for Organic Vapors (BM2308)
#42 Cartridge for Acid Gases
#43 Cartridge for Organic Vapors and Acid Gases
(BM2161) #R415 Filter for Dusts and Mists (BM2162)
#41 Cartridge and #R415 Filter for Dusts and Organic Vapors (BM2308)
#41 Cartridge and #R472 Filter for Paint Spray
#44 Cartridge for Ammonia
#R361 Filter for Metal Fumes, Dusts and Mists (BM2149)
#R436 Filter for Radioactive and Beryllium Dusts, Mists or Fumes
No. 841
No. 841
No. 841P
No. 842
No. 844
No. 843
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(Continued from page 244)

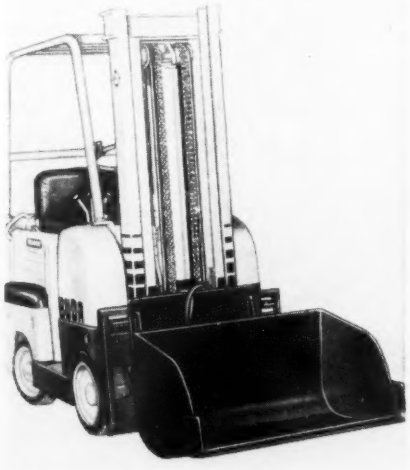
couple circuits that are a common cause of error in pyrometer indication and control. Unit utilizes a pulse of electrical energy sent through the thermocouple circuit, bridging the loose, corroded or defective joints. A difference in reading obtained before and after use of the unit indicates a fault. Device is available for manual or automatic operation and can be used on any kind of thermocouple wire. One unit can be used for many thermocouple circuits.

For More Details Circle No. 32—Page 239

Pencil Grinder: Air Equipment Corp., 1355 Michigan St. N.E., Grand Rapids, Mich.—Pencil grinder features finger-tip speed control which requires a quarter turn of operating valve to move from full open position to completely shut off position. Unit weighs 6 oz and is 5⅛-in. long. Work surface is kept clean by a stream of air directed upon the tip of the point. Grinder runs at minimum of 100,000 rpm.

For More Details Circle No. 33—Page 239

Fork Lift Attachments: Buda Co., Division of Allis-Chalmers Mfg. Co., Harvey, Ill.—Company's line of attachments for its fork lift trucks has been supplemented with hydraulic and mechanical scoop-type shovels. Attachments are designed to handle loose or bulk materials and are interchangeable with standard forks.



Mechanical shovel mounts directly to the fork hanger bar. The hydraulic shovel mounts in the same manner but is connected to the truck's hydraulic system by detachable hose couplings. The mechanical shovel is released by cam action.

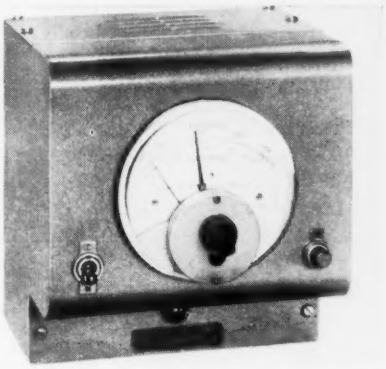
For More Details Circle No. 34—Page 239

Rectifier Brake: Harnischfeger Corp., Crane Division, 4606 West National Ave., Milwaukee 46, Wis.—Direct-current rectifier brake for use on alternating-current operated

hoists and small capacity cranes features a selenium rectifier which has no moving parts and provides direct action with very short stroke. Coil is sealed in pot with insulating type compound. The magnet pots and leads are stationary and there is no destruction of wires during brake operation. Entire assembly is all-welded for strength and durability.

For More Details Circle No. 35—Page 239

Temperature Controller: Cybertronic Corp. of America, Dept. F, Industrial Center, 3rd & Norton Aves.,



Chester, Pa.—Electronic instrument to control high temperature furnaces and other heating applications is claimed to be stable under all conditions, even where wide voltage variations are encountered. Unit uses a thermocouple type pyrometer in the input circuit and a power relay in the output circuit. It not only controls but also indicates and limits temperatures. Thermocouple break protection also is provided.

For More Details Circle No. 36—Page 239

Floor Repair Compound: A. C. Horn Division, Sun Chemical Corp., Long Island City, N. Y.—Repair and patching compound is designed for quick, permanent repair of interior concrete floors. In powder form, the material is mixed with water, poured into the cleaned out hole or crack, and leveled with the surrounding floor. Normal traffic may be resumed over the repaired area within 45 minutes after pouring. The compound is not recommended for use on exterior surfaces, on interior floors that are constantly wet or subject to spillage of water or acids, or for resurfacing entire floor areas.

For More Details Circle No. 37—Page 239

Fire Extinguisher Cart: American-LaFrance-Foamite Corp., Elmira, N. Y.—Mobile unit can carry three fire extinguishers and is especially useful in emergencies where one man, as a night watchman, has to fight a fire. Height is adjustable so that the cart may be made to hold a variety of types and sizes of extin-

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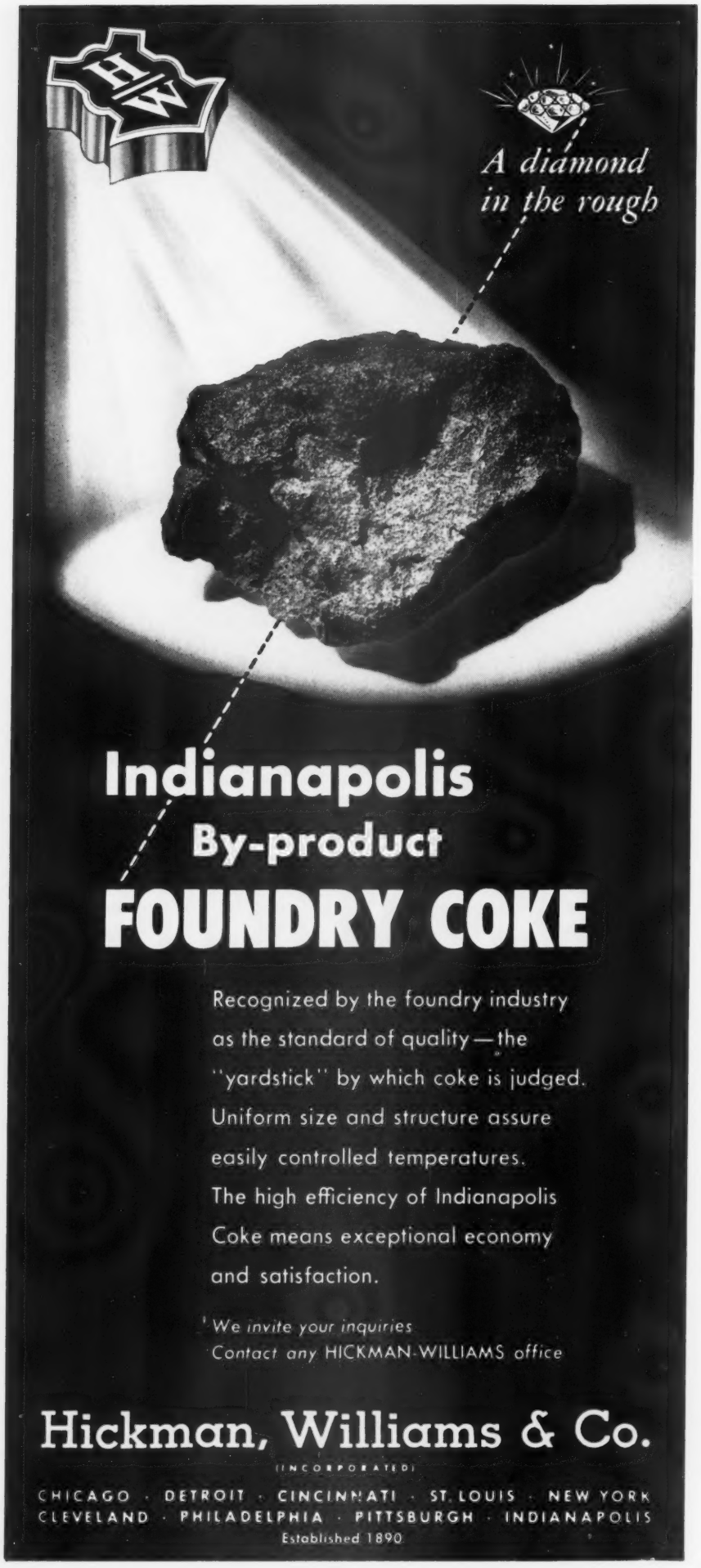
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guishers. Can also be used to hold standby extinguishers during welding and other operations that create fire risks.

For More Details Circle No. 38—Page 239

Hook Scale: Martin - Decker Corp., 3431 Cherry Ave., Long Beach 7, Calif.—Hydraulically operated hook scale has a guaranteed accuracy of ¼ of 1 per cent of capacity at any point on the scale. Accuracy is said to be unaffected by temperature and fluid changes. Pointer can travel an overload margin of 90 degrees beyond dial capacity. Dial has bold lines for distant reading and fine lines for close reading. Hook can be swiveled in any direction. Four capacities are available: 2500, 5000, 10,000 and 20,000 lb.

For More Details Circle No. 39—Page 239

Control Valve: Airmatic Valve Inc., 7317 Associate Ave., Cleveland 9, O.—Hand and foot operated four-

way valve with built-in, full capacity, flow control meters of the venturi type is designed for the control of double acting air or hydraulic cylinders. Basic valve can be supplied for remote pilot operation, cam, single or double solenoid together with time-delay features. Four standard pipe sizes, ¼, ⅜, ½, and ¾-in., for air, oil or water, in pressure range from 0 to 150 lb, are available.

For More Details Circle No. 40—Page 239

Asbestos Clothing: Wheeler Protective Apparel, 224 West Huron St., Chicago 10, Ill.—Line of aluminized asbestos clothing includes complete firemen suits, gloves, leggings, sleeves, aprons, helmets and other items where a high degree of protection from heat and radiant energy is required. Articles are made from herringbone weave, tropical-weight asbestos, treated with an aluminum coating. Garments are claimed to be pliable, durable and abrasion resistant. Coating reflects

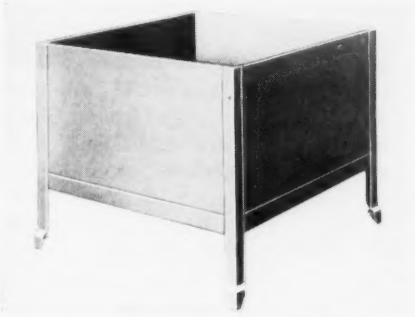
90 per cent of all radiant energy, making it possible for workers to stay on the job longer with fewer cooling-off periods.

For More Details Circle No. 41—Page 239

Clothes Locker: Penn Metal Corp. of Penn., 50 Oregon Ave., Philadelphia 48, Pa.—All-mesh locker provides natural ventilation through ¾-in. diamond-shaped openings in its 14-gage expanded steel sides, back and door. Available in 15 single tier sizes and 10 double tier sizes, it is finished in green or gray baked enamel. Lockers are furnished with coat hooks, number plates, chrome handles and choice of locks.

For More Details Circle No. 42—Page 239

Stacking Pallet Box: Factory Service Co., 4615 North 21st St., Milwaukee 9, Wis.—Stacking pallet box with 2 x 2 x ½-in. angles for corners and legs, and 3/16-in. steel for sides and bottoms, can be made in any size required. Height of bin and floor clearance are variable. Special "feet" welded into the legs enable the box to be stacked.



For More Details Circle No. 43—Page 239

Conveyor Roller: E. W. Buschman Co., 4421 Clifton Ave., Cincinnati 32, O.—For use with its conveyors, company has developed a 3½-in.-diam roller which is said to provide quick, easy starting of loads because its design aids in overcoming inertia of the roller at rest. Rollers are fabricated of 9-gage steel

Crescent Chaplets

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While we have just about every size and type of chaplet you can think of, there is a *possibility* that we don't have the *exact type* you require. In that case, we can design and develop *just the chaplet* to suit your requirements! We have all sorts of working samples available, and are always ready to ship them in a hurry to those who wish to try them.

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tubing, have 11/16-in. hexagon axles and are mounted in a 4-in. structural steel channel frame. Other types of frames as well as 5 and 6-in. channel are available. Load rating per roller is 1000 lb on level lines and 730 lb on gravity lines. Various types of bearings can be supplied.

For More Details Circle No. 44—Page 239

pH Controller: Bristol Co., Waterbury 20, Conn.—Electronic indicating pH controller has a variety of electric control actions and features a high torque, jeweled, millivoltmeter-type movement, a 7-in. mirror scale, and a dust and vapor-proof case. Following control actions can be supplied: Two position, two position with normal zone, two position with proportional input, and three position control. It will actuate a wide variety of final control devices, permitting pH control with any type of reagent, whether liquid, gaseous, or solid.

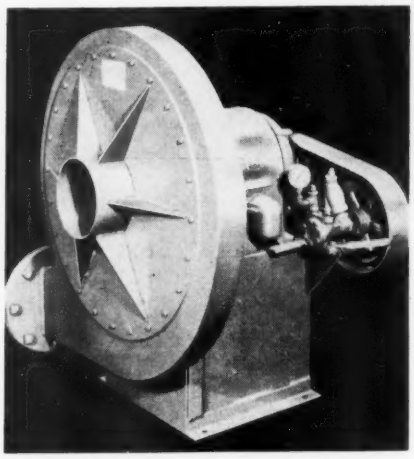
For More Details Circle No. 45—Page 239

Portable Air Heater: American Air Filter Co., Herman Nelson Division, Moline, Ill.—Portable air heater can be converted from electric

power to gasoline engine power in a few minutes. Being an entirely self-contained unit, the heater requires no ignition electrodes, transformers or relays for operation. Heat output may be regulated. Fuel tank is large enough to allow overnight operation without refueling. Heater will supply from 75,000 to 425,000 Btu's of clean heated air.

For More Details Circle No. 46—Page 239

Pressure Blowers: Chicago Blower Corp., 9867 Pacific Ave., Franklin Park, Ill.—Turbo-pressure blowers are said to eliminate noise



caused by transmissional vibration and breathing by use of gusset plates that rigidly brace front and back plates. Blowers are available in single and double inlet fans, direct or belt driven. Models can be furnished with an oil pump attachment. Units are for pneumatic systems and other applications requiring a steady, nonpulsating air pressure or suction. Units are designed to deliver their rated capacity only when operating at 3450 rpm, at air pressures from 4 to 24 oz.

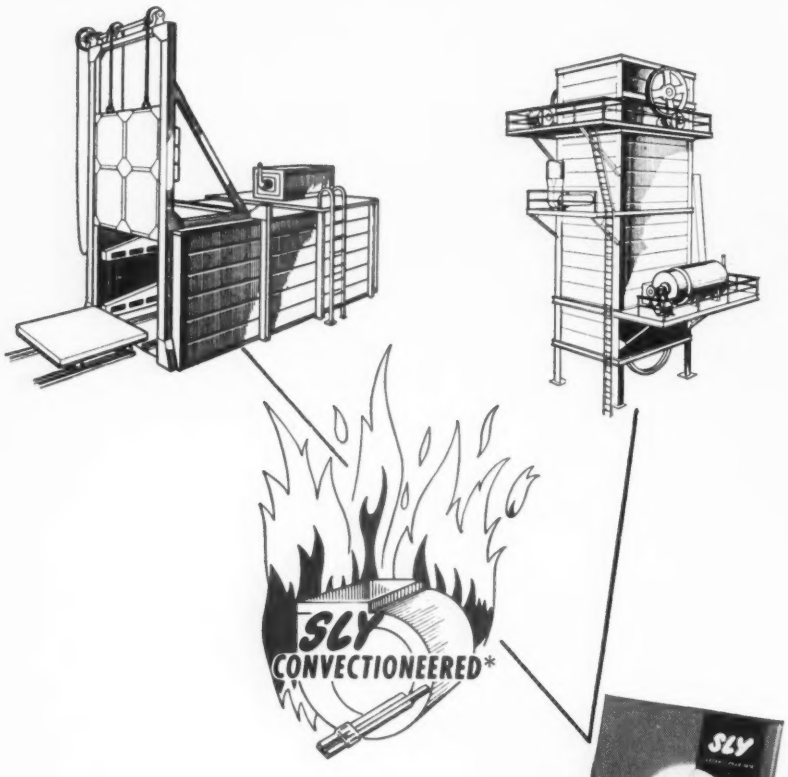
For More Details Circle No. 47—Page 239

Safety Switch: W. C. Dillon & Co., 14620 Keswick St., Van Nuys, Calif.—Electric safety switch is engineered to prevent overload damage to hoisting equipment. Device consists of a U-shaped bar of high grade tool steel designed to flex millions of cycles without losing its resil-

(*Continued on page* 252)

SLY INDUSTRIAL • OVENS

SERVING • INDUSTRY • SINCE • 1874



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Your inquiries are solicited whether your requirements are for simple ovens or large complicated continuous systems.

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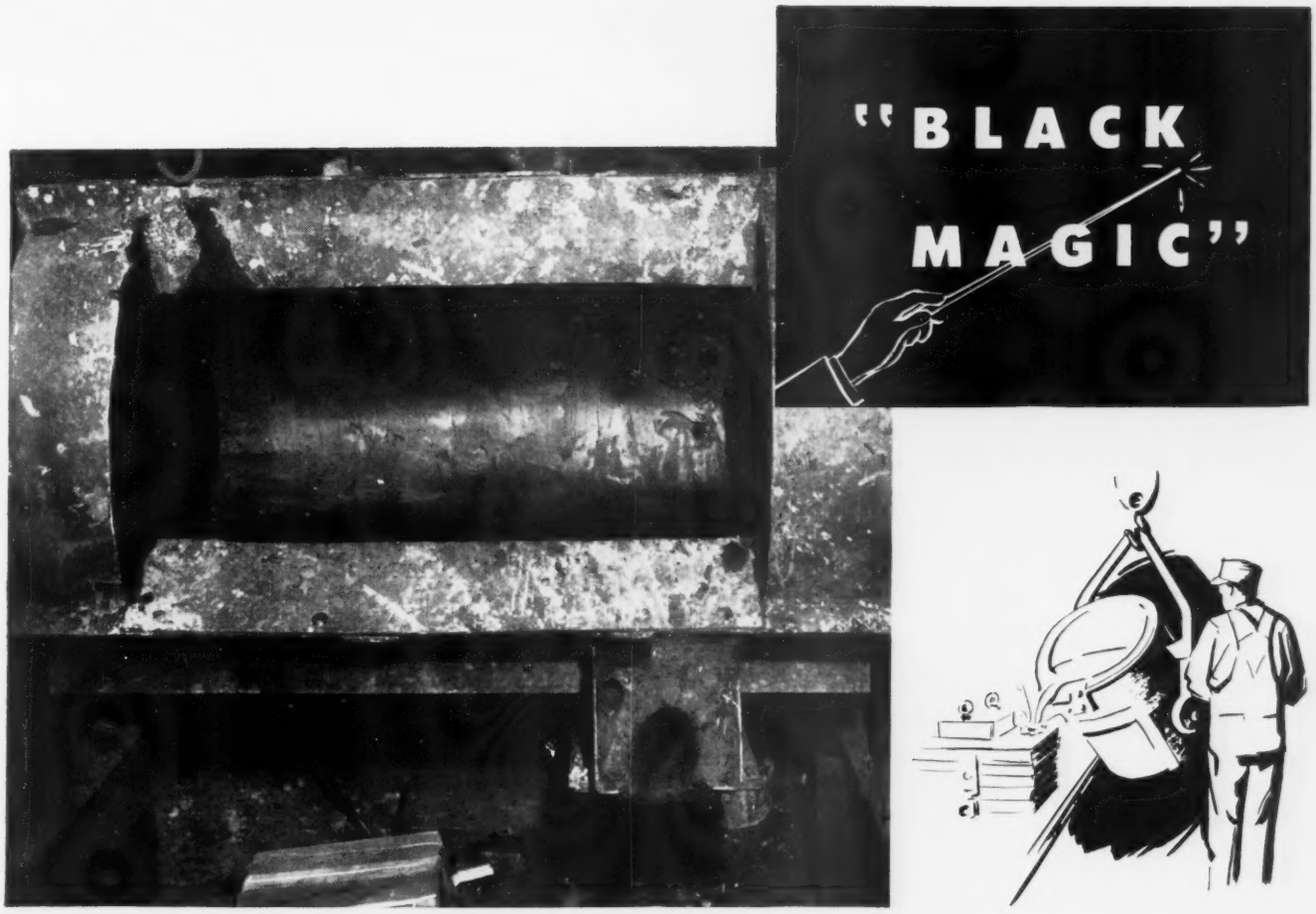

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"LOK"ing out the destructive affects of metal oxides and slags for greatly increased service life is the feat performed by Walsh Graflok Plastic Ladle Lining.

ADVANTAGES:

Easier Flow of Metal • Reduces Wear on Lining • Graphite Lubricating Effect Cuts Slag Adherence—Makes Removal Easier • Slashes Refractory Cost Per Ton of Metal Melted

USES:

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- **Bull Ladles, Hand Ladles—All Types of Foundry Ladles**
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- **Tap Holes, Slag Holes and Cupola Wells**
- **Nozzle Wells of Bottom Pour Ladles**
- **Hot Metal Troughs and Runners**
- **Lining of Cupola Front Slagging Spouts**

Walsh also makes—Graflok Ladle Coating. In dry form, in 100 lb. waterproofed bags, ready for immediate use by the addition of water.

Packed in 100 lb. waterproofed cartons—ready for use—sliced for ease in handling and in dry form for operators preferring plastic consistency for their particular needs. Packed in 100 lb. water proofed bags, for mixing with water on job.

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PERMEABLE MOLDS

CASTING plaster for nonferrous metals is said to yield quickly produced molds that combine the smoothness of plaster and permeability of sand. Manufactured by U. S. Gypsum Co., Chicago, it is called Hydroperm.

Following advantages are cited: 1. Molds can be poured by gravity; 2. Heads and gates can be planned according to good foundry practice; 3. Steam formed during the pouring operation escapes readily through the permeable mold; 4. Because calcination of the mold is not necessary, molds are more nearly true to size; 5. Mold shrinkage is minimized because high-temperature burnout is not required.

The permeability range can be varied and controlled to meet requirements. A mixer must be used to beat air into the mix to produce cells, and the higher the power input per unit of mix, the finer the permeable structure and the smoother the mold surface. Consistency can be varied from 70-100 parts water to 100 parts plaster. Enough air can be incorporated to increase the volume from 50 to 100 per cent during the mixing operation.

Above—Plaster slurry is poured into the assembled corebox housing. Calcination of the mold is not required

At left below—Plaster core segments fit precisely to form over-all circular core and meet exact tolerances

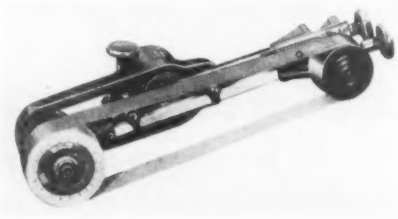
At right below—Final product is an intricate tire-recapping mold, cast from the new, permeable plaster mold

(*Continued from page* 250)

iency. Placed on the hoist hook or directly above it and in series with the load, it automatically breaks the lifting circuit whenever the preset safety maximum is exceeded, although allowing the load to be lowered for adjustment to a safe weight. Operating range is 500 to 10,000 lb. with a warranted accuracy within ½ of 1 per cent.

For More Details Circle No. 48—Page 239

Wheel Belt Grinder: B & E Mfg. Co., 407 Liberty St., Kansas City, Mo.—Flexible and maneuverable wheel belt grinder can be mounted on bench, pillar, portable table or any convenient place in the shop. A vertical adjustment of 360 degrees is possible. Grinder is said to have applications in foundries, pattern shops, machine shops and other operations requiring free hand grinding. According to the manufacturer, the machine can be used for finishing anything that needs surface removed.



For More Details Circle No. 49—Page 239

Belt Conveyors: Barber-Greene Co., 400 North Highland Ave., Aurora, Ill. — Standardized conveyor components for short-haul requirements may be assembled to form conveyors ranging from 8 to 44-ft, in increments of 1 ft. Mounted on a 5-in. channel frame, 18, 24 and 30-in. belt widths are available. Electric power units; crowned steel head and tail pulleys, ball bearing mount-

(*Continued on page* 254)

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It meets all requirements for space limitation. Uses overhead space under congested areas.

Versatile application. Hand or power operated carriers . . . many automatic features available.

MonoRail is permanent, inexpensive and has extremely low maintenance costs.

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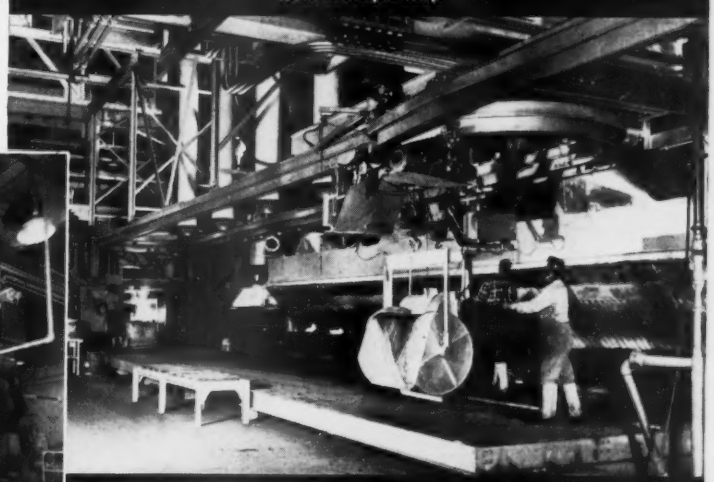
or we'll be glad to have our representative call on you.

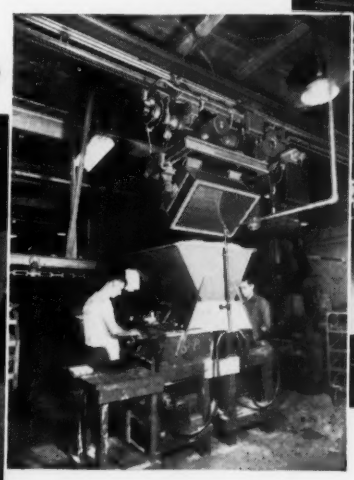
Free moving cranes cover large pouring floor

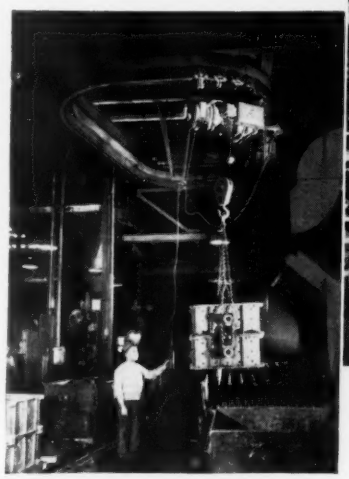
Hand pushed cranes serve mold preparation from conveyor loop



Continuous pouring with MonoTractor Carriers

Automatic dispatch delivery of fresh core sand





MonoTractor carrier serves shakeout from MonoRail loop

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in vertical and horizontal grinders

YOUR BEST BUY IS BUCKEYE

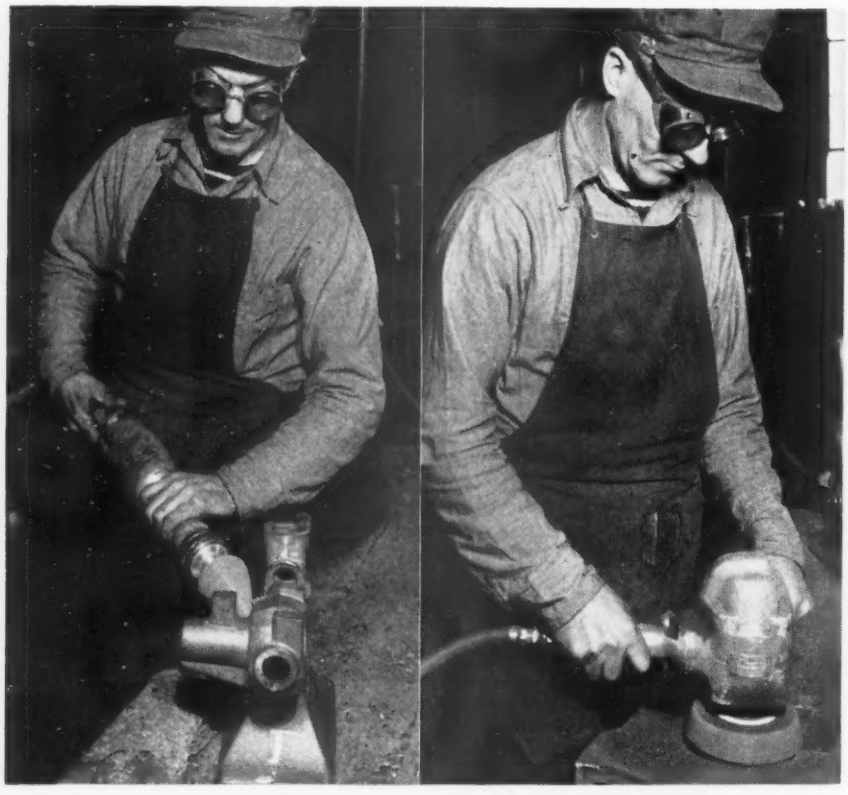
When you're completely satisfied with the quality of your products, and quite happy with your low production costs, just sit back—and watch your competition move out ahead!

Or, better still, start looking for methods to improve product quality and reduce production costs. Like an Ohio foundry, where a test *proved* that a lighter, faster Buckeye portable grinder could do an even better job, in less time, at lower cost. And, as a "bonus," this grinder has been operating for more than two full years without any repair service required.

In every industry, it's time to improve your competitive position. If this involves portable air tools, it's time to test Buckeye Tools in your plant, on your work, to *prove* them to your own satisfaction. May we send you a copy of our Air Tools Catalog?

Getting into the corners is easy with this lightweight, maneuverable Buckeye horizontal grinder. Faster speed means less wear on cone wheels, too.

On jobs where large, relatively flat surfaces are worked, Buckeye vertical grinders help increase productive output, improve product quality.



Buckeye Tools CORPORATION
DIVISION 20 • DAYTON 1, OHIO

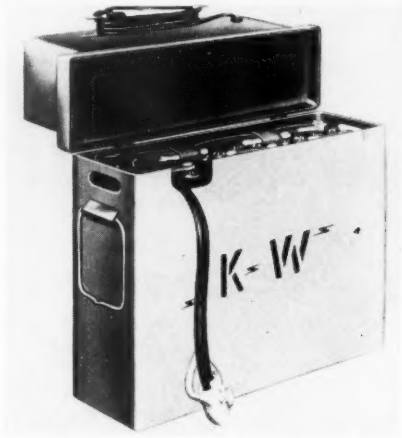
producers of the world's first successful rotary air tools

(*Continued from page* 252)

ed; ball bearing troughing carriers, and a lubrication system are other features. Capacities range from 50 to 480 tons per hour.

For More Details Circle No. 50—Page 239

Replacement Battery: K - W Battery Co., 3676 West Howard St., Skokie, Ill.—Replacement battery for



use in walkie powered lift trucks has a permanently mounted charger. Battery remains on the truck and can be given a boost whenever truck is not operating by plugging into any 110 v, 60-cycle outlet. Charger can be left on without damage to battery. Routine charging can be done overnight. Top tilts back for easy access to battery for adding water.

For More Details Circle No. 51—Page 239

Protective Clothing: Far-Ex Corp., 75 West St., New York, N. Y. —Lightweight fire repellent fabric offers certified protection against raging flames and radiant heat temperatures up to 2500° F., according to manufacturer. Fabric is made into suitings and protective equipment by fusing the fabric to metallic layers topped with aluminum foil. Reflective power is said to reach almost 100 per cent. Suits weigh 5 to 10 lb. Fabrics can be sewn into garments for every purpose as well as into gloves, protective covers, tarpaulins, tents, face shields, etc.

For More Details Circle No. 52—Page 239

Input Controller: Winslow Co., 9 Liberty St., Newark 5, N. J.—Input controller can be added to any existing industrial "on-off" temperature control system that is thermocouple actuated to maintain heating temperatures as close as ±0.2°F., according to the manufacturer. Insertion of the input controller into an existing control system dynamically shifts the control point in direction and magnitude to counteract the effects of thermal inertia. By anticipating thermal lag, under or

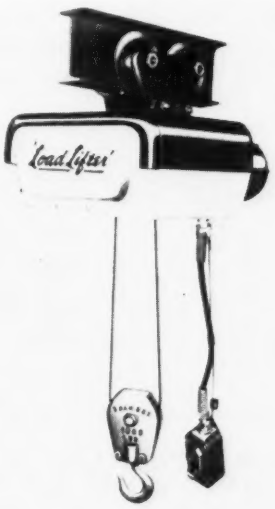
over-shooting is eliminated and a straight line graph results on the temperature recorder chart.

For More Details Circle No. 53—Page 239

Magnetic Floor Sweeper: Homer Mfg. Co., Lima, O.—Magnetic floor sweeper features permanently energized magnet assembly, semi-pneumatic tires with ball bearing wheels, and tubular steel handles with plastic handle grips. Sweeper reportedly is safe with no danger of shock to employees, fire or explosion when used in plants having inflammable or explosive products. Can be used in wet or dry locations. Automatic stripping device makes unloading easy. Operator need not touch refuse material at any time. Three models in seven sizes are available with all sizes adjustable 1 to 3 in., ground to magnet.

For More Details Circle No. 54—Page 239

Lightweight Hoist: Shaw - Box Crane & Hoist Division, Manning, Maxwell & Moore Inc., Muskegon, Mich.—Developed for production lifting jobs, small, lightweight, push-



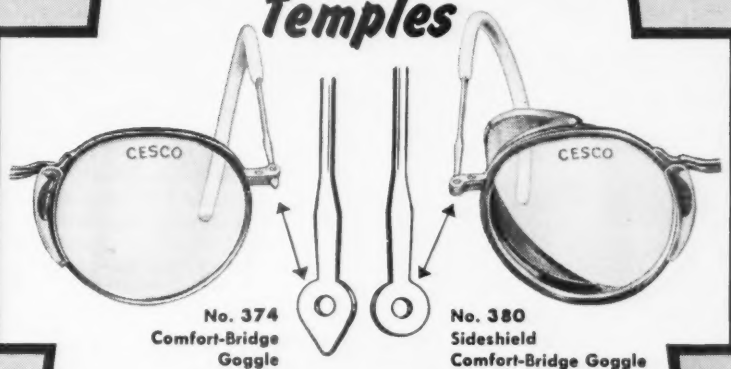
button-controlled electric hoist of the wire rope and drum type is available with lug, upper hook and trolley suspensions in capacities of 1000 and 2000 lb. Frames are made from aluminum alloys. Other construction features are alloy steel heat treated gearing with machine shaved teeth, double brakes, machine grooved drums of large diameter, interchangeable suspension and positive upper stop to prevent overtravel.

For More Details Circle No. 55—Page 239

Fork Lift Trucks: Baker - Raulang Co., Baker Industrial Truck Division, 1230 West 80th St., Cleveland 2, O.—Company has added a new line of gasoline-powered fork lift trucks to its complement of materials han-

CESCO *RIGHT... before your Eyes!*

NEW Temples



No. 374 Comfort-Bridge Goggle

No. 380 Sideshield Comfort-Bridge Goggle

Now, CESCO Comfort-Bridge Goggles are furnished with new symmetrical tip temples which are interchangeable—right or left.

These new temples are better looking and designed with greater strength at the endpiece joint where breakage usually occurs. That's because the flat bar of the temple is at a right angle to the tip.

Insulators, made of attractive flesh-colored extruded plastic, are easy to replace. They slide freely over the flexible shaft ends and are automatically held in place. Closed end of the plastic insulator keeps shaft from poking through.

Added to the many other features of CESCO Comfort-Bridge Goggles, these new temples make the **No. 374** and **No. 380** CESCO Goggles the most acceptable of any safety glasses. Workers like to wear them. Service costs are lower because repairs are easier, and less frequent. And . . . they're "*RIGHT... before your Eyes.*"

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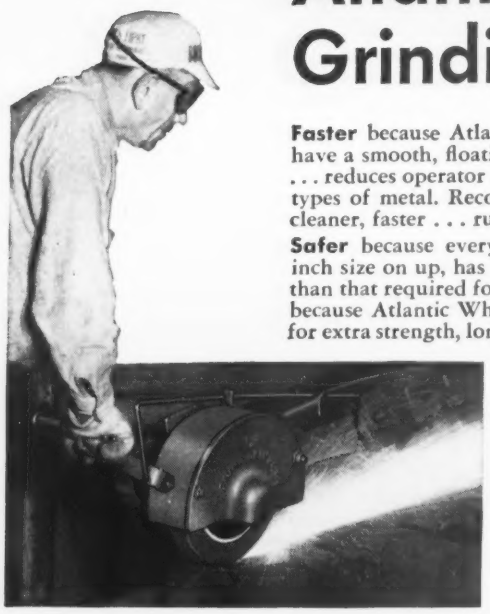
Making WHEEL WORK
faster . . . safer . . . more economical

Atlantic Speed-Tested Grinding Wheels



Faster because Atlantic Speed-Tested Grinding Wheels have a smooth, floating action that requires less pressure . . . reduces operator fatigue . . . speeds up grinding on all types of metal. Records prove that Atlantic Wheels cut cleaner, faster . . . run cooler on job after job.

Safer because every Atlantic Wheel sold, from the 2 inch size on up, has been test run at a 50% higher speed than that required for normal operating conditions. Safer because Atlantic Wheels feature a special Resinoid bond for extra strength, longer life under high operating speeds.

More Economical. Experienced operators find that Atlantic Grinding Wheels seldom have to be dressed . . . reduce clogging or glazing to a minimum . . . consistently lower replacement costs. Why not try them and see for yourself. Write now for complete details. Atlantic Abrasive Corp., 534 Pearl St., South Braintree 85, Massachusetts.

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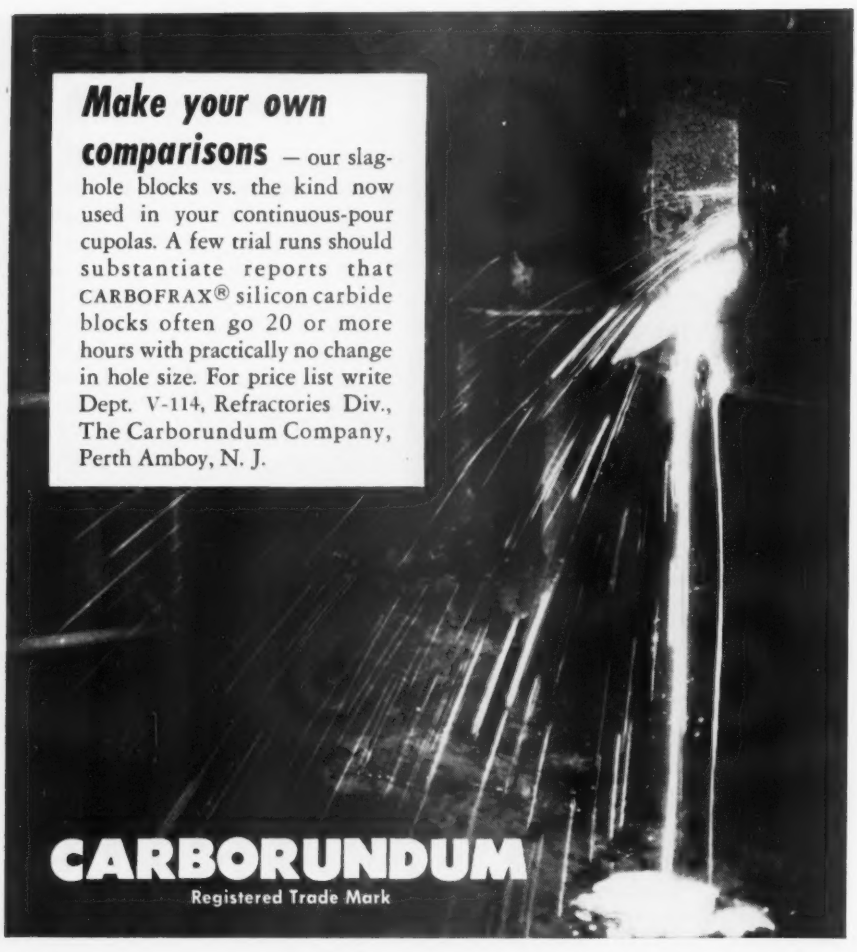
Make your own comparisons — our slag-hole blocks vs. the kind now used in your continuous-pour cupolas. A few trial runs should substantiate reports that CARBOFRAX® silicon carbide blocks often go 20 or more hours with practically no change in hole size. For price list write Dept. V-114, Refractories Div., The Carborundum Company, Perth Amboy, N. J.

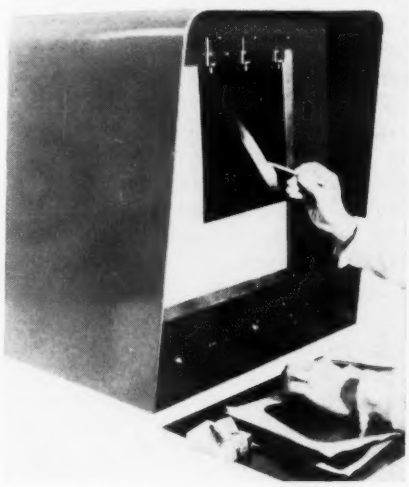


CARBORUNDUM
Registered Trade Mark

dling equipment. Units feature 130 in. lift and a short turning radius. Models are of 3000, 4000, and 6000-lb capacities. Clutch is rated at twice the torque capacity of the engine. There are two speeds in both forward and reverse.

For More Details Circle No. 56—Page 239

X-Ray Film Viewer: Mitchell Radiation Products Corp., 128 E. Washington St., Norristown, Pa.—



Compact, high intensity viewer for interpreting industrial x-ray film permits spot scanning and study of any part of film as well as 14 x 17-in. illumination. Viewer eliminates need to remove film to a spot position for higher intensity illumination by providing a 250-w flood lamp that can be moved horizontally and vertically in back of 14 x 17-in. screen by operator at control panel. Lamp provides a 3-in. round spot of variable intensity and variable aperture. Heat is kept away from film by a fan in the base of the unit.

For More Details Circle No. 57—Page 239

Corrosion Protection: Galvicon Corp., 40 West 29th St., New York 1, N. Y.—Coating for protecting iron and steel surfaces from corrosion is applied by brush or spray, combines with the base metal and galvanizes it, and provides mechanical as well as chemical protection. The material reportedly leaves a coating of 96 parts by weight of chemically-pure zinc. A single coating at brushing consistency covers approximately 625 sq ft per gal, according to the manufacturer. Within 40 minutes after application it is tack free and dries completely ready for use within 48 hr.

For More Details Circle No. 58—Page 239

Abrasive Disc: Minnesota Mining & Mfg. Co., 900 Fauquier St., St. Paul 6, Minn. — Depressed center abrasive disc for rough grinding is made of aluminum oxide mineral in a reinforced fabric and resin con-

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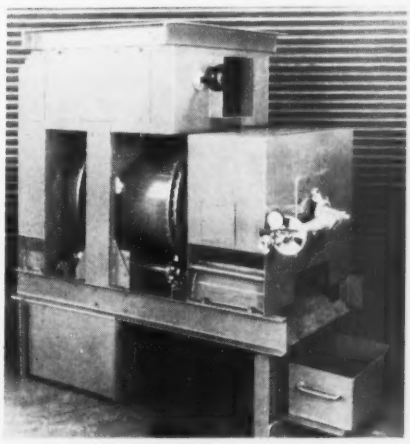
struction said to contribute to fast cutting and safe operation. Disc is designed for slotting and portable cutoff operations and heavy weld removal. Two sizes, 7 and 9⅛-in., are available. Speeds of 5500 and 6000 rpm are recommended for the large and small sizes, respectively.

For More Details Circle No. 59—Page 239

Aluminum Alloys: Kaiser Aluminum & Chemical Sales Inc., 1924 Broadway, Oakland 12, Calif.—Company has two pig alloys suitable for the manufacture of commercial aluminum castings. Immediate shipment of the 50-lb pigs can be made from the company's reduction plant at Chalmette, La. One alloy is for use with permanent mold and sand castings, the other is commonly used in die castings. The former contains the following alloying elements: Cu 3.5-5.0, Si 5.5-7.5, Fe 0.6 max. The latter contains 3.0-4.0 Cu, 7.5-9.5 Si, 0.6-1.0 Fe. Both contain 0.1 max of other impurities.

For More Details Circle No. 60—Page 239

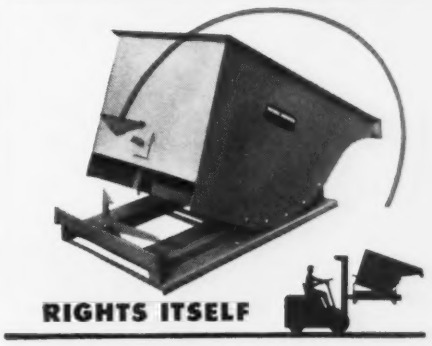
Rotating Drum Dryer: Roberts & Schaefer Co., 130 North Wells St., Chicago 6, Ill.—Rotating drum dryer is made for drying or heating granular crystalline materials. It requires a floor area of 3 x 5½ ft with an overall height of 6 ft. Operation is

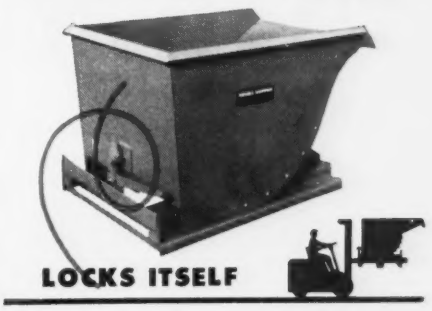


by either bunker oil or gas. Positive pin-sprocket transmission to rotating drum and pin to pin cam transmission to turntable feeder disk is claimed to prevent slippage at high or low capacity, high or low speed. Variable speed drive permits manual selection from 8 to 24 rpm of drum rotation. Hourly capacity is 3 tons.

For More Details Circle No. 61—Page 239

Hoist: American Engineering Co., Armingo Ave. & Cumberland St., Philadelphia 25, Pa.—Electric hoist with welded steel chassis features heat treated alloy steel, straight line, three-reduction spur gears, automatic heavy-duty type lowering brake, also a heavy-duty





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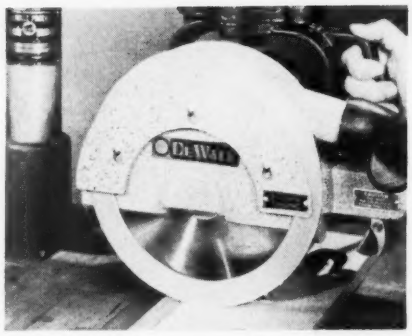
hoist and crane type motor with single speed pushbutton control; completely shrouded, all-steel safety type bottom block; ball bearing sheaves, with hook carried on anti-friction thrust bearing. Capacities are 2 and 3-ton.

For More Details Circle No. 62—Page 239

Radiographic Inspection: Gamma Industries Inc., Baton Rouge, La.—Portable gamma ray machines utilize radioactive isotopes to produce x-ray-type pictures of industrial products. According to the manufacturer, these rays can penetrate steel plate up to 8 in. thick. The radioactive rays pass through a dense article, as a casting, and strike against photographic emulsions in holders behind the test object. When developed, the film reveals a shadow picture of the specimen and its internal structure.

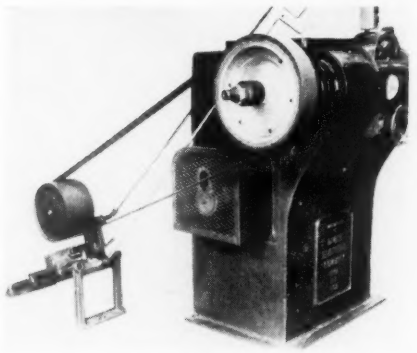
For More Details Circle No. 63—Page 239

Safety Guard: De Walt Inc., Lancaster, Pa.—Safety guard with free floating safety action offers operator protection from moving parts of radial arm type woodworking equipment without reducing machine versatility, according to the manufacturer. As the two circular rings which enclose the saw blade are not fastened directly to the stationary top half of the guard, they are free to adjust automatically to any cutting position. The rings always maintain their protective position with relation to the blade because of retaining plates, which serve as guides. Guard is available for use with 9, 10 and 12-in. saw blades on the company's woodworking machines.



For More Details Circle No. 64—Page 239

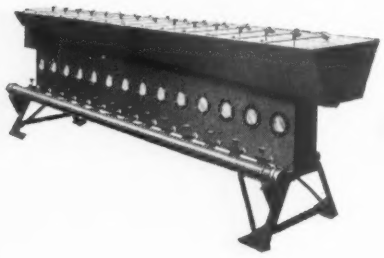
Backstand Idler: Fenlind Engineering Co., Rockford, Ill.—Heavy-duty backstand idler employs a 6-in.-wide plastic wheel to prevent marring of the surface by abrasive particles. Width of the idler wheel permits a belt width range of ¼ to 6 in. Idler has two control arms, one to tilt the wheel from one side to the other, and the second to slide the wheel assembly back and forth on its stand to correct belt tension to make up for changes in either belt length or contact wheel size without opening the blower hood. This traversing mechanism will accommodate a range of contact wheels from 3 to 16 in.



For More Details Circle No. 65—Page 239

Hose Coupling: Titeflex Inc., 500 Frelinghuysen Ave., Newark 5, N. J.—Quick-seal, leak-proof hose coupling is for heavy-duty, high-pressure, heavy-flow industrial applications. Complete range of sizes up to 12 in. are available. Couplings are made in aluminum, brass, stainless steel and other alloys on request.

For More Details Circle No. 66—Page 239



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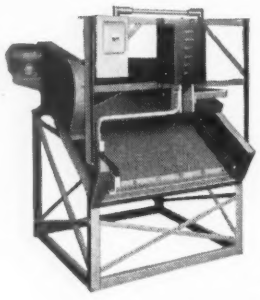

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HYDROGEN CONTROL IN LIGHT METALS

Is Highlight of Discussion at MIT Conference

This article concludes the report, begun last month, on the Massachusetts Institute of Technology light metals casting conference, sponsored by the Foundry Section, Metals Processing Dept., MIT

By GEORGE D. CHANDLEY
Massachusetts Institute of Technology

FURTHER items discussed at the two-week MIT light metals casting conference included gates and risers, grain refinement and heat treatment, development and properties of magnesium casting alloys and other subjects. Hydrogen control received particular emphasis.

Gating and Risering—Donald L. LaVelle, American Smelting & Refining Co., reviewed gating practices which have worked successfully for him for many years.

The first part of the gating system (and frequently most neglected) is the sprue. The ladle should be held next to the sprue to reduce the velocity and surface of the metal stream for reaction with the atmosphere. The sprue must be placed at the edge of the flask and the molds should be put on a rack so that the pourer does not have to bend. Also, the ladle should not be filled to the top as pouring in this way is difficult and erratic.

A pyramidal pouring cup eliminates vortex action that is found in a round pouring cup. All sprues, runners, and gates should be rectangular; the sprue should be tapered so that it can be kept full and enclose the metal in an oxide sheath. A choke in the top of the runner is a good idea; in practice a choke works as well as a well at the base of the sprue. The best practice is to put the runner in the drag and the ingates in the cope, because this allows the runner to fill and all ingates to feed evenly. If the runner is in the cope, 75 per cent of the metal will go through the gate farthest away from the sprue, creating turbulence and hot spots. In many cases it is necessary to put shrink bobs over the ingates.

Gates should enter the casting via risers wherever possible. Risers should be large enough to maintain the dimensions of the casting and should be round, as corners act as chills. Chills should be used to maintain directional solidification.

Prof. C. M. Adams Jr., of the MIT Department of Metallurgy, gave a survey of the specific characteristics of titanium that require special procedures in gating and risering. Large gates are required because only a small amount of superheat can be given to the metal. Titanium cannot be arc melted in a vacuum, so an inert gas must be used; there is danger of entrapping the inert gas in the rapid pouring that is necessary. Hydrogen is very soluble in liquid titanium and forms a hydride at low temperatures. The problem of hydrogen contamination seems a very formidable one. Titanium freezes like steel, it has a skin strength, so that it will feed "uphill," contrary to the action of other light metals.

Defects commonly encountered are entrapment of argon, gross shrinkage, gas porosity, cold shut, and mold-metal interface reaction.

John Kura, Battelle Memorial Institute, presented results of Battelle's many years of research on gating systems. The research centered on two classes of gating systems, horizontal and vertical, the principal distinguishing feature being that vertical gating systems are taller and do not run far horizontally. Lucite molds and water were used in the experiments, and a variety of gating systems were tried. The gating system that allowed earliest clearing of the entrapped air from the water casting was considered best.

Describes Characteristics

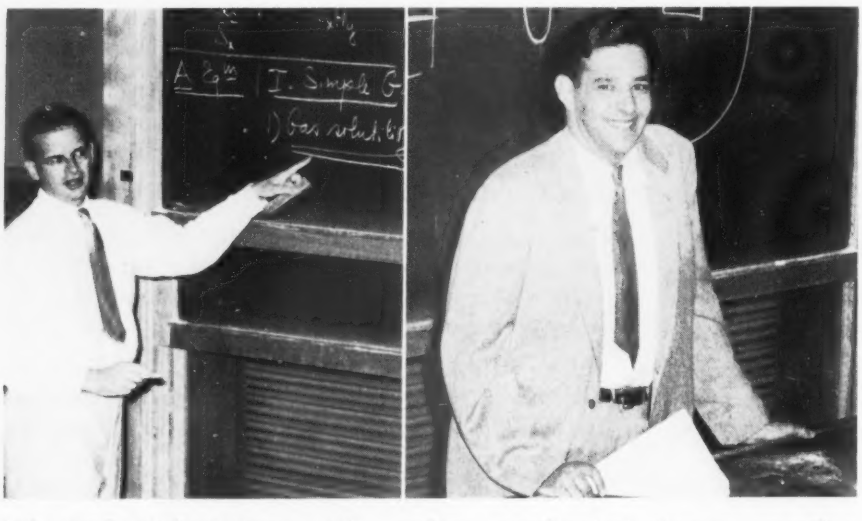
The best gating system in either case is a tapered sprue with a well at the bottom, the cross section of the well equalling five times that at the base of the sprue. Depth of the well should be twice that of the runner.

If the base of the sprue is considered to be 1, then the ratio of base sprue area to total runner area to total ingate area should be in the range 1 : 4 : 4 to 1 : 6 : 6. Mr. Kura presented a detailed calculation of the dimensions of a gating system that would introduce metal into the mold cavity at a given flow rate.

Experimental work on vertical gating systems confirmed the effect of sprue taper and well. In addition, a continuous web ingate which extended along the entire height of the casting proved to be the best type of ingate.

Prof. C. M. Adams Jr. discussed solidification and risering of light metals. Pure metals have no liquid-solid or "mushy" zone of freezing. Usually, any shrinkage porosity appears locally, and no micro-porosity is found. Alloys usually exhibit a semisolid region during solidification somewhere in the mold. Width of this zone determines the effectiveness of directional solidification in the casting; a wide zone gives very poor

(*Continued on page* 262)



Left, Prof. Michael Bever, MIT, explains metallurgical theories regarding origin of gas problems in castings. Right, Samuel Lipson, Frankford Arsenal, describes arsenal's research on methods for quantitatively estimating hydrogen content of aluminum heats before pouring. (Photos by George Schmidt, MIT)

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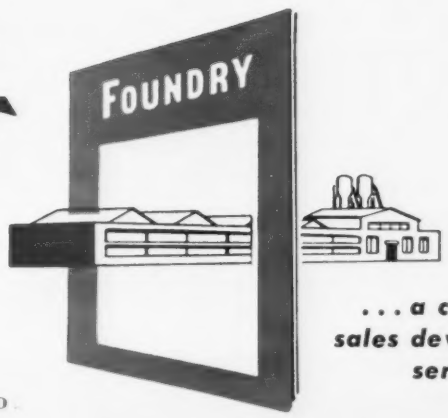

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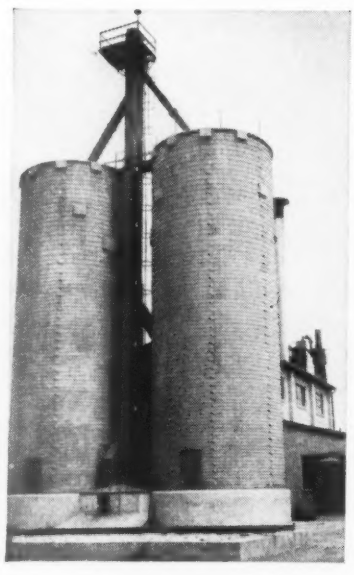

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(*Continued from page* 260)

directional solidification. Width of the zone is high when 1. Conductivity of the metal is high; 2. Heat flow is slow (low thermal gradients); 3. There is a long liquidus-solidus temperature gap on the phase diagram.

With aluminum and magnesium alloys, freezing under low thermal gradients allows the hydrogen to segregate into certain volumes of the metal and to precipitate out as gas porosity. Some micro-porosity almost invariably occurs in nonchilled aluminum castings.

Chivorinov's rule for calculation of riser sizes is usually effective for aluminum and magnesium alloys. By use the equation $(1 - \beta)\ V_r/V_c = A_r/A_c + \beta$, where V_r = volume of riser; A_r = area of riser; V_c = volume of casting; A_c = area of casting; and β = fraction of solidification shrinkage, one can calculate riser sizes. Riser shape should be chunky; a cylinder is a good shape.

Sleeves Are Beneficial

Exothermic riser sleeves will set up steep temperature gradients, but may cause gas adsorption and give low mechanical properties. For 4-in. cubical, open risers of aluminum and magnesium, only about 8 per cent of the heat content of the riser is lost out the top. This figure contrasts to about 42 per cent lost out the top by steel. These figures indicate that insulation sleeves around aluminum and magnesium risers would be beneficial.

Walter Sicha, Aluminum Co. of America, lectured on grain refinement and heat treatment of aluminum casting alloys. Grain refinement gives wider distribution of alloy phases, changes the shape of shrinkage voids and improves the feeding characteristics of the alloy (reduces the tendency for the surface to sag if the section is not risered). The first two characteristics of grain refinement increase the tensile properties.

Grain refinement commonly is achieved by adding a 5 per cent titanium-aluminum hardener to the heat so that the percentage of titanium is at least 0.1. Boron in conjunction with titanium gives a longer lasting grain refinement. Grain size of alloy 195 refined with titanium does not vary with freezing rates. Since titanium slows down the aging process, longer aging times must be used. Magnesium will reduce the effectiveness of a given addition of titanium.

Mr. Sicha observed that aluminum castings can be given varying heat treatments which yield a variety

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of mechanical properties. All aluminum-copper alloys will age at room temperature unless they have been artificially aged. Some castings are overaged to prevent change in dimension after machining since aluminum alloys expand during solution treatment. During aging they contract, and if they are slightly overaged, they are dimensionally stable.

Dr. Thomas Leontis, Dow Chemical Co. metallurgical laboratories, presented an extensive discussion of a proposed mechanism for grain refinement of magnesium base aluminum-zinc alloys by the superheat method. The grain refining action is due to manganese-aluminum particles which nucleate the melt. Grain size of the magnesium alloys is strongly dependent on rate of solidification, finest grain sizes being obtained in sections that are cooled rapidly.

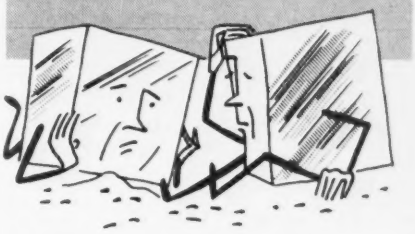
Grain size of magnesium castings does not exert a profound effect upon the static properties of magnesium alloys, but impact strength of magnesium castings decreases as grain size increases. Hot tearing is reduced by a fine grain size. Grain refinement is usually done by superheat method for the AZ type alloys, whereas alloys containing zirconium always are fine-grained.

Beryllium, even in trace amounts, causes large grain size in alloys refined by superheat, and it should be avoided. Grain growth during heat treatment will occur only if certain conditions are fulfilled: 1. Low manganese content; 2. Aluminum content above 8 per cent; 3. Chilled particular volume of the casting. Grain size can be controlled by carbon inoculation in the presence of iron or manganese.

Dr. Leontis also discussed various types of heat treatments given to magnesium alloys and how these

"Kick it a couple times, we need every drop!"

The case of the grounded ice cubes . . .



The operations of a Buffalo ice-making plant came to a costly impasse. Ice cubes were grounded for want of some way to unclog their transporting devices. Hammering was slow and often damaging to the equipment.

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treatments affect the microstructure. Magnesium-rare earth, and magnesium-thorium alloys may be heat treated as high as 1050° F. Rare earth alloys maintain their dimensions during solution heat treatment better than the more common AZ alloys.

In another session, Dr. Leontis, presented an elaborate survey of the development and properties of magnesium casting alloys. Dow has made alloys of magnesium with almost every element in the periodic table in an attempt to uncover useful light alloys. Aluminum, zinc and zirconium are the main elements contributing to strength of magnesium alloys. Rare earth alloys and thorium alloys are used because they maintain some strength at temperatures above 300° F. Dr. Leontis described how foundry characteristics, such as fluidity, porosity tendency and hot tearing, vary with composition of alloys. The fatigue limit for all magnesium casting alloys is about the same; more important than the composition of the alloy is the condition of the surface. Shot blasting the surface increases the fatigue limit significantly.

Corrosion resistance is an important feature of magnesium alloys. Accelerated tests have been devised to judge the relative corrosion resistance of alloys, but these tests do not give an estimate of the service life of the part. Usually, magnesium is given a protective coating of some kind, anyway. Iron, nickel, cobalt and copper in minute amounts cause magnesium to corrode rapidly. Manganese and zinc increase the amount of iron that can be tolerated; however, this amount still is small—on the order of about 0.01 per cent iron. Cast anodes of magnesium used for sacrifical anodes must be low in iron and copper and have about 0.15 per cent manganese in order to be efficient.

Iron Lowers Properties

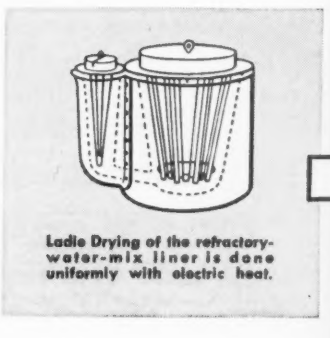
Walter Sicha also discussed the properties of aluminum alloys and their development from early times. Fatigue strength is almost uniform for cast aluminum alloys. Company publications give up-to-date data on work on alloy development. Mr. Sicha said that iron has a strong effect on the properties of cast aluminum and that it should be kept as low as possible. Melting in iron pots is bad practice if high properties are desired. Future high strength aluminum alloys probably will be multi-element types of copper, magnesium, manganese, nickel, titanium and silicon.

Ralph Edelman, Frankford Arsenal, Stuart Arnold, Watertown Arsenal, and Dr. David I. Sinizer, National Research Corp., described a variety of methods for melting and casting titanium. The main difficulty in melting titanium is the reactivity of the molten metal. Arc melting in a water cooled crucible surrounded by an inert atmosphere is common to all practices. Nitrogen, carbon, oxygen and hydrogen are the elements which severely embrittle titanium, and they must not be present even in small quantities. Hardness is used as a method for judging purity of the metal. Titanium alloys of aluminum, iron, chromium and manganese give better strengths than pure titanium. Furnaces that will melt 50 lb of high quality titanium now are being developed. Main difficulty in casting is lack of suitable mold material. However, National Research Corp. seemingly has solved the problem of mold material. It is likely that only a few mold materials will be effective.

John Kura showed the experimental results obtained at Battelle Memori-

Another CHROMALOX Production Tip

ELECTRIC HEAT UNIFORMLY DRIES LADLE LINERS



Ladle Drying of the refractory-water-mix liner is done uniformly with electric heat.

PROBLEM

Dry liners quickly and get ladles back into use; reduce rejects due to the uneven drying of the manually operated gasoline torch method on ladle liners; reduce the high man-hour cost of drying each of the ladle linings; make work area more comfortable.

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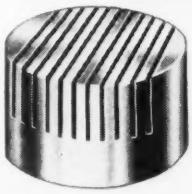
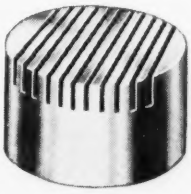
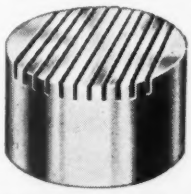


X-TRA DEEP HEAD .156 Wide Slots .014

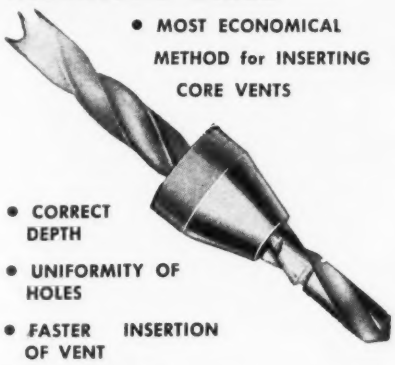


DEEP HEAD .093 Wide or Narrow Slots .014 .010



SHALLOW HEAD .031 Wide or Narrow Slots .014 .010

INSERTING DRILL



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al Institute on almost every type of molding material. Battelle was able to obtain good surfaces, but always got surface contamination.

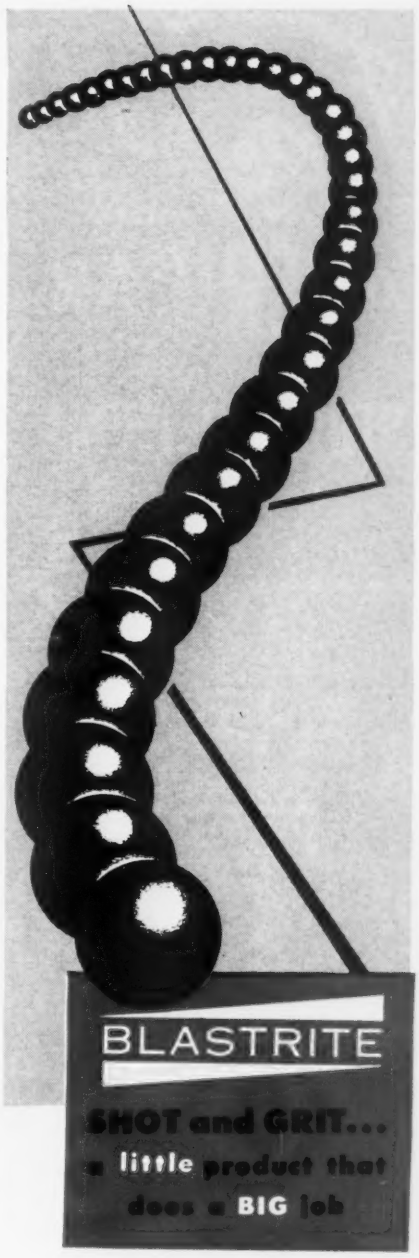
If National Research Corp. has solved the refractory problem, then it is likely that large amounts of titanium castings will be used. Discussion revealed that the Air Force and also the trucking industry would be willing to pay a premium for saving in weight.

Prof. Harold Udin, department of metallurgy, M. I. T., gave a lecture on welding of light metal castings. Three fundamental factors have to be considered when casting is welded: 1. Effect of heat on metallurgical structure of the alloy; 2. Effect of heat on dimensions and residual stresses; 3. Chemical reactions that may take place under certain conditions. In some instances, as with the aluminum-silicon alloys, no change in structure is caused by heat from the rod. All age hardening alloys are affected by heat of the rod, and their effects can be determined readily from a phase diagram. A rapid weld reduces the volume of metal affected. Mechanical effects of welding are the greatest headache, for tensile stresses are left in the weld. These stresses may be high enough to make the weld appear brittle. Rapid welding and stress relief by heat treatment can eliminate the mechanical effects introduced by welding.

Use Inert Atmospheres

Chemical effects are important in the light metals, especially in titanium. Aluminum and magnesium should be welded in an inert atmosphere, and titanium must be welded in an inert atmosphere, or very brittle welds will be obtained. In direct current welding, two thirds of the heat is generated at the anode so that if the heat is needed for a deep weld, the work should be the anode. There is a cleaning action at the cathode, so for shallow welds or a metal with a low heat of fusion, the work should be the cathode. Alternating current welding gives intermediate cleaning action and depth of penetration. Helium generates seventy per cent more heat than argon, but it is easier to maintain an arc in argon than in helium. Another factor to consider is that helium is cheaper than argon.

Prof. H. F. Taylor, department of metallurgy at M. I. T., lectured on the chemistry and mechanics of bonding in sand molding. Prof. Taylor described the origin of the different types of clays and the reasons for their different physical properties.



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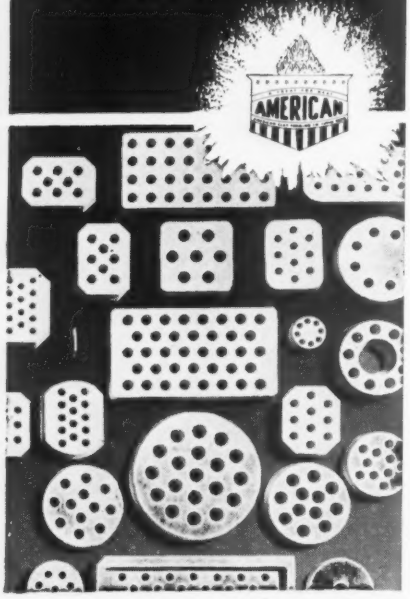

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The secret of the bonding action of clays lies in the exchange ions of the particles. By controlling the kinds and amount of exchange ions, one can determine the properties of the clays. Experimental work now is going on at M. I. T. to discover new exchange ions for common clays that will give properties useful in the foundry. Prof. Taylor also described and illustrated a property of sand known as dilatency.

Dilatency describes the fact that a volume of closely packed particulate material must expand in order to undergo a change in shape. The dilatency of sands is a property that some day should be useful in molding practice, but at present no one has considered it in practical molding problems.

One of the most important metallurgical problems in light alloy castings is the high solubility of hydrogen in the liquid metal and lower solubility in the solid. A full day was spent on the subject of control of hydrogen in the light metals.

Prof. Michael Bever, department of metallurgy, M. I. T., opened the lectures with a talk about gases in metals. Prof. Bever covered all types of gas-metal reactions from the standpoint of equilibrium considerations and kinetics of reactions. Rare gases and nitrogen do not react with aluminum or magnesium; the principal reactions of molten aluminum and magnesium are with oxygen and water vapor to form oxides and dissolved hydrogen. Increasing the temperature increases the rate of reaction and the solubility of hydrogen. The main difficulty in casting is that the hydrogen is less soluble in the solid than in the liquid.

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This property causes the hydrogen to segregate like any other alloying element; thus the last metal to freeze in a casting might well be saturated with hydrogen even though the over-all concentration of hydrogen is below the solid solubility. Alloying elements do not affect the solubility of hydrogen in aluminum alloys to any practical extent. Prof. Bever said that he thinks more hydrogen can be dissolved in aluminum and magnesium by reaction with water vapor than by reaction with hydrogen gas. In closing, he said that aluminum must be substantially hydrogen-free in order to prevent gas porosity in the casting, and magnesium must be degassed substantially below the solid solubility, or gas porosity will occur.

Practical Hydrogen Control

Dr. L. W. Eastwood, Kaiser Aluminum Co., spoke about practical methods for controlling hydrogen in aluminum. Dr. Eastwood cited reasons for controlling gas content in light alloys. Gas content can cause the following: 1. Leakiness; 2. Reduction of percent of elongation and tensile strength; 3. Poor appearance on machining; 4. Financial loss. Also, in forgings hydrogen causes low transverse properties. The only important source of hydrogen is from water, occurring as follows:

1. Atmosphere—some castings cannot be made on damp days.
2. Combustion — several per cent steam occurs in combustion products from gases commonly used to melt aluminum.
3. Ladle linings—may be damp or hold adsorbed water at low temperatures.
4. Tools—all metal tools have adsorbed gases, even though they may not appear wet.
5. Fluxes—most contain 2 or 3 per cent water even when dry. Flux wets magnesium, giving good contact for transfer of hydrogen to the melt.
6. Pouring—passing molten metal through 1 ft of humid atmosphere gives considerable hydrogen pickup.
7. Sand mold—lots of water vapor and low permeability of molds increase gas pickup.

In order to avoid hydrogen pickup, one must take the above sources into account. In any case, even if the heat has been melted under the best conditions, it must be degassed with a hydrogen-free gas. Degassing is more effective if initial gas content is low. Chlorine is the best gas for degassing. It is very dry and cleans the melt of suspended oxides;

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the Al_2Cl_3 formed acts as a dry atmosphere cover over the melt to reduce the gas pickup.

Samuel Lipson, Frankford Arsenal, described methods developed there for estimating the amount of hydrogen in the melt before pouring. Mr. Lipson and staff developed a rapid reading gravitometer for measuring densities of reduced pressure test samples. The measurement can be made in about 30 seconds and has an accuracy of ± 0.02 grams per cu cm. Absolute measurements are difficult because the base density of the sample is difficult to determine. Volume of gas entrapped is that present at the freezing point of the metal. Some gas is lost out of the sample. Mr. Lipson noted that sometimes hydrogen is lost from the melt during holding. Also, one must wait for all of the fluxing gas to float out of the melt before taking the sample.

Prof. C. M. Adams Jr. presented some experimental data about the sources of gas. Degassed aluminum was run through a 20-in., ½ x 1-in. runner, and the final gas content was checked. Severity of gas pickup increased as mold material went from dry sand to core sand to shell mold to green sand. Conventional reduced pressure test samples do not show very good results for magnesium alloys, and results may be erratic because of the high vapor pressure of magnesium. Under certain experimental conditions, the staff at M. I. T. has noted adsorption of hydrogen from the air when the melt was held at 1300° F.

Prof. Adams also presented an equation which can be used to calculate accurately the minimum volume of gas that must be bubbled through the melt to reduce the hydrogen to a very low level.

Prof. H. F. Taylor, M. I. T., added in discussion that a company which recently put on sale a new, low priced reduced pressure tester already has sold 40 models.

Must Understand Solidification

The process of solidification is a fundamental metallurgical consideration that must be well understood if casting processes are to be improved. Dr. M. C. Flemings, American Brake Shoe Co., discussed the behavior of alloying elements during solidification. Alloying elements almost always segregate during solidification. The solvent metal shoves the solute metal into the remaining liquid; the solute metal then must diffuse into the liquid. If the metal solidifies rapidly, the solute does not have time to segregate, and it is possible to form a solid solution by rapid solidification. Thus, not only is the segregation ratio (1 — % solute in solid/% solute in liquid) important, but also the diffusion rate in the liquid.

Plane front freezing, which gives a completely sound casting, is helped by these factors: 1. Steep temperature gradients; 2. Slow freezing rate; 3. Small amount of alloying element; 4. Small segregation ratio (1 — K where K = % solute in solid/% solute in liquid); 5. High diffusion in the liquid.

Dr. Flemings described the apparatus in which all of the above variables were controlled and plane front solidification was produced. Various binary alloys of aluminum were solidified, and the relative segregating tendency of each was noted.

Dixon Chandley, of the M. I. T. staff, described research results concerning the tensile properties of magnesium alloys. This research was sponsored by the Ordnance Corps to determine why the mechanical properties of cast magnesium were lower than those of wrought alloys

(*Concluded on page* 270)

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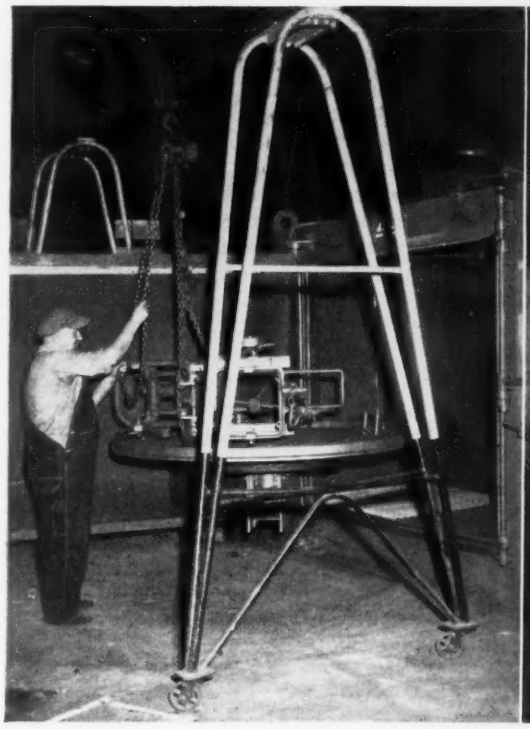

How To Keep Cleaning Payroll Costs In Line

Chicago Dubuque Foundry Corp. Slashes Labor Costs with the Airless Wheelabrator

When it requires 17 man-hours daily to clean just six tons of gray iron castings, the $5 per ton labor cost makes it almost impossible to compete in the jobbing casting business. Chicago Dubuque Foundry Corp. had to face this problem head-on—their obsolete tumbling mill and wire brushing cleaning room practices were an anchor to profitable operations.

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(*Concluded from page* 268)

of similar composition. Factors considered to exert some effect on the tensile properties of magnesium were grain size, chemical composition, hydrogen content of the metal, crystal structure and thermal gradients during solidification. Data available in literature enabled researchers to estimate readily the effects of grain size, chemical composition and hydrogen content of the metal. The modes of deformation of magnesium, twinning and slip, in conjunction with the nature of the hexagonal, closely packed structure are the most important determinants of yield strength and tensile strength. Wrought magnesium products are mechanically anisotropic, the properties being high in one direction and low in another direction. Because of the orientation of the crystals in cast magnesium, Mr. Chandley said, maximum tensile strength obtainable in a casting is about 80 per cent that of an extruded bar. Maximum yield strength in a casting is about 50 per cent that of an extruded bar. Elongation obtained in a casting should be as high as or higher than that in an extruded bar.

Mr. Chandley then showed part of his experimental data which supported the above statements regarding crystal structure. In the casting of magnesium it was shown to be extremely important to chill the casting. Unless castings of ½ in. or more are chilled, they undergo internal oxidation during heat treatment, and variable, low mechanical properties result. Proper chilling of a ¾ x 5 x 8 in. plate casting reduced the variation in ultimate tensile strength to less than 5 per cent. Chivorinov's rule provided a riser size that was sufficient for the casting; larger riser sizes actually reduced tensile properties.

Dr. W. D. Walther, Ford Motor Co., spoke on the prerequisites for casting high strength aluminum. The prime concern in aluminum casting is the hydrogen content of the melt since it is impossible to get high tensile properties with a gassy metal. In every case it was necessary to chill the aluminum castings to get high mechanical properties. Dr. Walther made aluminum castings (75S) with a tensile strength of 82,000 psi and an elongation of 10 per cent. By adding 0.035 per cent tin to alloy 195, he was able to double the yield strength of the alloy. Yield strengths in excess of 50,000 psi were obtained.

Dr. Walther made many measurements on thermal gradients during solidification of a variety of plate castings. He related that the tensile properties showed a linear variation when plotted against thermal gradients during solidification. There also was a rough correlation between tensile properties and solidification time. Dr. Walther said that the variation with thermal gradients is due mainly to porosity distribution in the plate casting. Porosity is at a minimum when thermal gradients are high. This porosity is calculable for certain shapes and for pure metals that contain no dissolved gases. Calculations performed thus far show excellent correlation with experimental results for aluminum, magnesium, tin and steel.

Builds Formaldehyde Unit

Operation of a new formaldehyde producing installation has been announced by Reichhold Chemicals Inc. The new unit, located in Charlotte, N. C., the first formaldehyde plant in the middle south, started operations Oct. 15. Formaldehyde combined with phenol is used as a resin in the shell molding process.

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French Technical Center Issues 1953 Report

Centre Technique des Industries de la Fonderie, Paris, has issued its annual report for 1953. The report shows that the organization did a great amount of work in many fields for the benefit of the French foundry industry as a whole.

In general research, work was done on the influence of gases on the structure of alloys, the use of radioactive isotopes for the study and examination of castings and the use of statistical methods in the industry.

Gray iron research included work on the modulus of elasticity and damping qualities of gray iron and on the influence of phosphorus on gray iron. Studies were made of the basic-lined cupola and the use of hot blast for cupolas. With the Ecoles Centrale des Arts et Manufactures, investigations were made into the absorption of hydrogen by gray iron in the solid state, both hot and cold, and into the mechanism of the solidification of gray iron.

In the field of malleable iron, the influence of boron on the properties of blackheart malleable was analyzed.

Research in steel covered investigation of methods of obtaining test pieces from various types of ingots for mechanical tests of steel castings, of weldability of steel castings, of the fluidity test and of atmospheric heads and risers.

In nonferrous castings, the following were studied: Elimination of aluminum in bronzes; influence of lead and tin on characteristics of high-duty brass; effect of oxidizing treatment on molten bronze; properties of phosphorus bronze as related to phosphorus content; conditions of chemical equilibrium during the melting of bronze containing lead; and the influence of arsenic in gases emitted during melting of nonferrous alloys.

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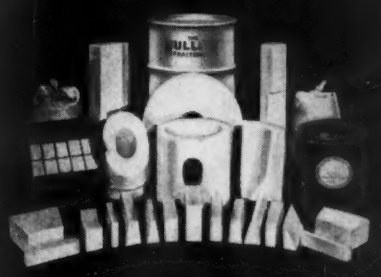

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Investigations on light alloys included: Influence of the sodium treatment on A-S4 G alloy; influence of iron and manganese on light alloys of the Alpax type; standardization of dimensions for tensile tests on small test bars; nitrogen degassing of aluminum alloys; use of low-frequency induction furnaces for melting and holding magnesium alloys; improvement of properties of light alloys with high silicon content by addition of phosphorus and sodium; use of an alloy steel core for gravity die casting of light alloys; and microporosity in magnesium alloys.

Other studies were made on molding techniques, raw materials and other subjects. At the main laboratory of the Centre Technique, at Sevres, near Paris, investigations of methods of analysis were made, some of which were adopted. Much work of a practical nature was done on the production of castings, and assistance also was given to the industry through literature made available by the Centre through its journals, *La Fonte* and *Fonderie*. Brochures also were published on individual subjects.

Considerable work was done by 12 committees of the Centre. Standardization of certain castings and flasks was studied in collaboration with the French Standards Institute. A number of "labels" guaranteeing standards of quality were issued for certain foundry requisites and for some specific types of castings.

One of the main functions of the Centre is to assist individual foundries with their problems. In 1953, the main laboratories undertook 60,883 analyses of all kinds, and the local laboratories did 106,126.

President of the Centre Technique during 1953 was Pierre Ricard, an original promoter of the group. Activities are supervised by Auguste E. Le Thomas, general director.

Safety Requirements Are Compiled in Handbook

Industrial safety requirements are compiled in the "Handbook of Industrial Safety Standards," published by the Association of Casualty & Surety Companies. The new ninth edition, greatly expanded, includes new chapters on welding and cutting, storage and handling of flammable liquids, radiatioin hazards, disaster control.

Other subjects included are safety programs, accident investigation, materials handling, illumination, exhaust systems, electrical equipment and many others in its 315 pages. Copies may be obtained from the Association at 60 John St., New York 38, N. Y. The price is $1.40 per copy.

TRADE PUBLICATIONS

For more details on these items use reply card — page 239

INSULATING BRICK: Harbison-Walker Refractories Co., Farmers Bank Bldg., Pittsburgh 22, Pa.—Data on six insulating brick in classes from 1600°F to 3000°F are given in bulletin EB-D. Information on heat losses, heat storage capacities, cold face temperatures and hot face temperatures is included.
For More Details Circle No. 141—Page 239

FROZEN MERCURY PROCESS: Mercast Corp., 295 Madison Ave., New York 17, N. Y.—Complete story of the uses and advantages of frozen mercury precision castings, illustrations of the process and pictures of finished parts are given in an eight-page booklet.
For More Details Circle No. 142—Page 239

SHELL MOLDING: Mechanical Handling Systems Inc., 4000 Nancy Ave., Detroit 12, Mich.—Fully automatic single-station shell molding machine is described in pictures of operating cycle. Included in bulletin SE-2 are specifications and dimensioned drawings.
For More Details Circle No. 143—Page 239

CUPOLA DUST CONTROL: Mechanical Industries Inc., 905 Grogan Bldg., Pittsburgh 22, Pa.—Technical discussions and drawings of a variety of cupola dust control systems are found in bulletin 3. The author presents his approach to the problem of collecting cupola dust dry.
For More Details Circle No. 144—Page 239

CORE BLOWER: Redford Iron & Equipment Co., 20733 Glendale, Detroit 23, Mich.—Illustrations, features and specifications of a core blower for cores weighing from a few ounces to 10 lb are given in bulletin 4.
For More Details Circle No. 145—Page 239

NONFERROUS HEAT TREATING: Surface Combustion Corp., Toledo 1, O.—Bulletin SC-166 covers furnaces for heat treating nonferrous metals. Equipment for forming, annealing, solution heat treating and aging are illustrated and described.
For More Details Circle No. 146—Page 239

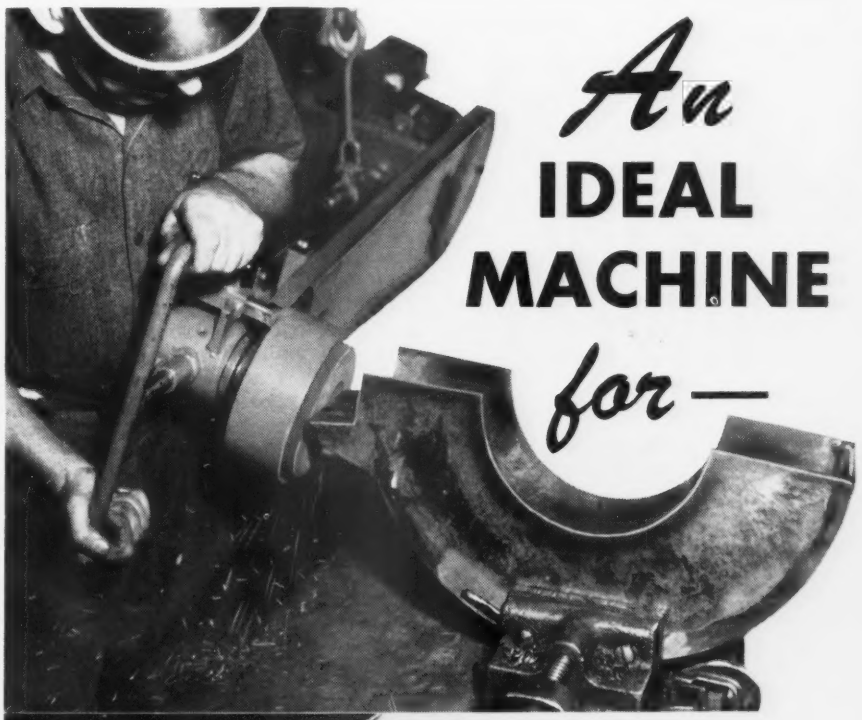
FOUNDRY SANDS: Hardy Sand Co., P. O. Box 476, Evansville, Ind.—Booklet includes a discussion of company sand production methods with tables giving analyses of 18 basic grades of sand.
For More Details Circle No. 147—Page 239

STEEL FLOORING: Flash-Stone Co., 3723 Pulaski Ave., Philadelphia 40, Pa.—Rolled steel flooring plates and their uses are illustrated in a 16-page catalog.
For More Details Circle No. 148—Page 239

SMALL FORK TRUCK: Materials Handling Div., Market Forge Co., Everett 49, Mass.—Design and function of small fork trucks is discussed in a new booklet, "Why the Small Fork Truck?" Space, time and labor factors involved in small plant operation are analyzed.
For More Details Circle No. 149—Page 239

ADJUSTABLE SLINGS: Caldwell Co. Inc., 1830 Camp Ave., Rockford, Ill.—Equalizing and locking sling is described and pictured in form 354. Data table is included.
For More Details Circle No. 150—Page 239

STORAGE BATTERIES: Edison Storage Battery Div., Thomas A. Edison Inc., West Orange, N. J.—Electrical data, weights and dimensions of battery assemblies for in-



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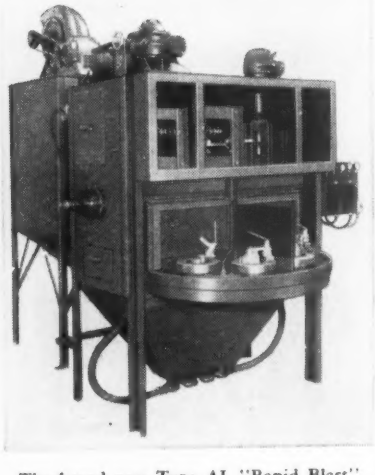

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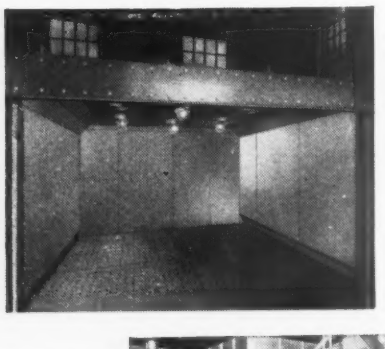

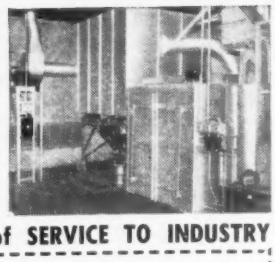

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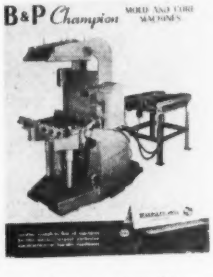
For More Details Circle No. 151—Page 239

HIGH - TEMPERATURE FURNACES: Minneapolis - Honeywell Regulator Co., Industrial Division, Wayne & Windrim Aves., Philadelphia 44, Pa.—Instrumentation for measurement and control of temperatures during heat-up of open hearths, glass tanks and other high-temperature furnaces is discussed in data sheet No. 6.4-11.

For More Details Circle No. 152—Page 239

MOLD AND CORE MACHINES: Beardsley & Piper Div., Pettibone Mulliken Corp., 2424 North Cicero Ave., Chicago, Ill. — Booklet illustrates manual and completely automatic core rollover and draw machines. A semi - automatic option which is available is also described. Drawings, dimensions and pictures of coreroom operations give further information. Machines for stripping plate molding, pin-lift molding machines, pin-lift machines for installations with sand slingers and other molding machines are shown in foundry installations in bulletin 5200.



For More Details Circle No. 153—Page 239

NONSHRINK GROUTING: Master Builders Co., 7016 Euclid Ave., Cleveland 3, O.—Folder describes the successful grouting of heavy equipment with nonshrink mortar. Outlines and illustrations show common methods of grouting different types of equipment, the mixing and placing of grout and cold and hot weather grouting.

For More Details Circle No. 154—Page 239

CORE AND MOLD WASHES: United States Graphite Co., Division of the Wickes Corp., Saginaw, Mich. —Booklet describes core and mold washes for ferrous and nonferrous practice. A table tells how to apply washes and gives suggested Baumes.

For More Details Circle No. 155—Page 239

WELDING DESIGN MANUAL: Eutectic Welding Alloys Corp. 40-40 172 St., Flushing, N. Y.—Contains detailed instructions on joint design, overlaying and hard-surfacing, and illustrations on inspection and control of welds.

For More Details Circle No. 156—Page 239

GRINDING WHEELS: Norton Co., Worcester 6, Mass.—New 28 page catalog describes reinforced resinoid grinding wheels. Tables of wheel sizes and operating speeds are included in catalog 1748.

For More Details Circle No. 157—Page 239

WELDING AND CUTTING: Air Reduction Sales Co. Div., Air Reduction Co. Inc., 60 East 42nd St., New

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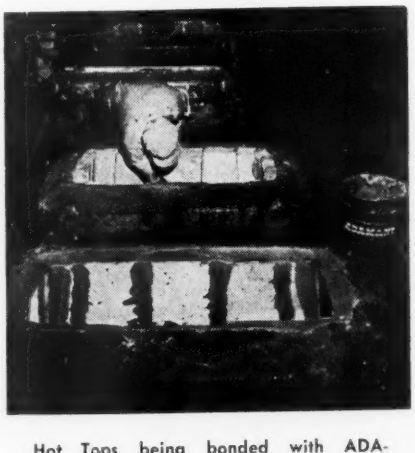

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York 17, N. Y.—Gases, welding and cutting equipment and accessories—torches, tips, regulators, electrodes, etc.—are covered by catalog ADC 662B. An explanation of how each item operates and the jobs to which it is best suited comprises a part of the catalog.

For More Details Circle No. 158—Page 239

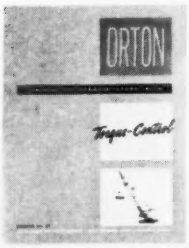
LITERATURE LIST: Electro Metallurgical Co. Div., Union Carbide & Carbon Corp., 30 East 42nd St., New York 17, N. Y.—More than 60 different booklets available on the production, properties, fabrication and uses of alloy steels and irons are described in a new literature list. Many of the publications are based on work conducted in the company's own research laboratories.

For More Details Circle No. 159—Page 239

pH ELECTRODES: Leeds & Northrup Co., Advertising Div., 4907 Stenton Ave., Philadelphia 44, Pa.—Catalog EN-S5 covers chemicals for electrode servicing and auxiliary electrode equipment but is primarily designed to present electrode assemblies for measurement, recording and control of solution pH and redox potentials.

For More Details Circle No. 160—Page 239

CRAWLER CRANES: Orton Crane & Shovel Co., 608 South Dearborn St., Chicago 5, Ill.—Application of torque control to crane drives is described in catalog 87. The torque control unit is cooled ingeniously and although it eliminates slip-clutching and racing engines and allows pinpointing of power control with the exact power needed to move the load, there is little or no loss of efficiency. The torque unit is described in detail.



For More Details Circle No. 161—Page 239

WASH COLLECTOR: Ducon Co., 147 East Second St., Mineola, N. Y.—Centrifugal wash dust collectors combining exhauster and precipitator are described in bulletin W-7053. A table of specifications is included.

For More Details Circle No. 162—Page 239

BATTERY MAINTENANCE: Electric Storage Battery Co., Box 8109, Philadelphia 1, Pa.—Catchy cartoon treatment emphasizes seven basic rules of storage battery maintenance and care in pocket-size booklet 5063.

For More Details Circle No. 163—Page 239

ROTARY FILING: Rota - File Corp., 1974 66th St., Brooklyn, N. Y.—Bulletin lists complete range of shapes and sizes of rotary files. Table of operating speeds and illustrations are included.

For More Details Circle No. 164—Page 239

POWER TRANSMISSION: American Pulley Co., 4200 Wissahickon Ave., Philadelphia 29, Pa.—Split

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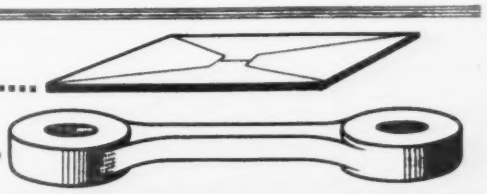

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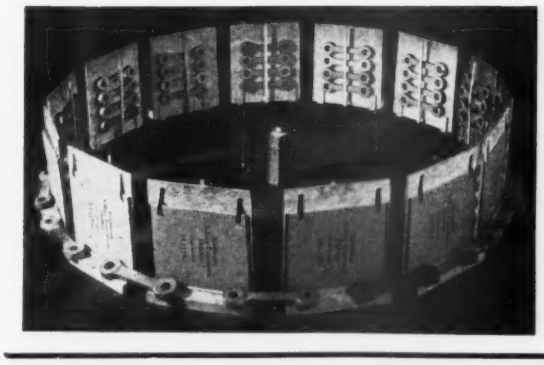

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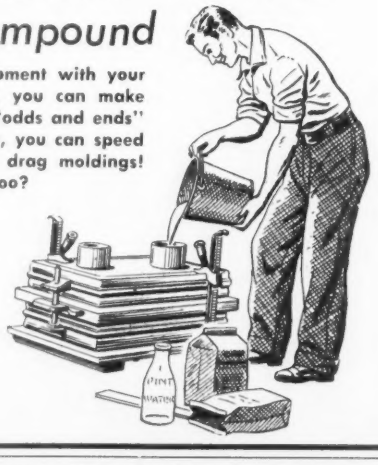

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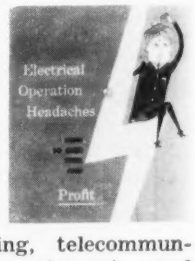
steel pulleys, conveyor pulleys, speed reduction drives and other power transmission units are described in an illustrated brochure.

For More Details Circle No. 165—Page 239

ROTARY HANDLE VALVE: Ross Operating Valve Co., 120 East Golden Gate Ave., Detroit 3, Mich.—Four way air valve, 2 in. high with poppet type seals is described in bulletin 307. Operation, service information, installation data, parts list and an exploded view of component parts are included.

For More Details Circle No. 166—Page 239

ELECTRICAL MAINTENANCE: B. Eichwald & Co., 237 East 39th St., New York 17, N. Y.—Symptoms and remedies for electrical failures in office and industry are illustrated in a 16-page brochure "Electrical Operation Headaches —How to Cure Them and Profit." Wiring, lighting, telecommunications, safety equipment and electronics are among the problems discussed in the booklet. A prescription of survey, service and maintenance is specified as the cure for electrical headaches.



For More Details Circle No. 167—Page 239

DEHYDRATION UNITS: J. F. Pritchard & Co., Equipment Div., 210 West 10th St., Kansas City 5, Mo.—Packaged dehydration units for efficient drying of air or other gases in industrial, processing and laboratory installations are described in bulletin 16.0.081.

For More Details Circle No. 168—Page 239

MICROMETERS: George Scherr Co., 200 Lafayette St., New York 12, N. Y.—Micrometers and their inspection are described in a pamphlet. Features, illustrations and price list are included.

For More Details Circle No. 169—Page 239

CLEANING GUIDE: Oakite Products Inc., 127B Rector St., New York 6, N. Y.—Plant maintenance cleaning guide consists of charts recommending cleaning materials and their use.

For More Details Circle No. 170—Page 239

ELECTRIC FORK TRUCKS: Baker-Raulang Co., 2150 West 80th St., Cleveland, O.—Book 64 examines the construction of electric fork lift trucks by the use of 20 pictures and explanatory copy.

For More Details Circle No. 171—Page 239

SPEED CONTROL: Reeves Pulley Co., Columbus, Ind.—New fractional horsepower motor speed control unit is described in bulletin M-543. Illustrations and tables are included.

For More Details Circle No. 172—Page 239

EN MASSE CONVEYOR: Gifford-Wood Co., Hudson, N. Y.—The conveying of materials in an en masse

conveyor is described in a new bulletin. Dimensioned engineering drawings and an isometric cut-away section of a vertical run explain the operation.

For More Details Circle No. 173—Page 239

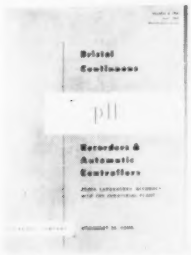
INDUSTRIAL PRODUCTS: American Brake Shoe Co., 230 Park Ave., New York 17, N. Y.—Representative products produced by the 11 divisions of the company are illustrated in its first complete catalog. It contains sections on ferrous castings, nonferrous castings, bearing materials, sintered metals, steel forgings, welding supplies, air compressors, industrial pumps, dredge pumps and railroad products.

For More Details Circle No. 174—Page 239

ULTRASONIC GENERATOR: General Electric Co., Schenectady 5, N. Y.—An explanation of how an ultrasonic generator works, the principles of high-frequency sound cleaning and examples of applications are explained through photographs and drawings in bulletin GEA-6056.

For More Details Circle No. 175—Page 239

pH INSTRUMENTATION: Bristol Co. Waterbury 20, Conn.—Complete instrumentation for pH measurement and automatic control is covered in bulletin Q1304. Featured are complete pH systems, including the electrode assemblies, amplifier and round or strip-chart recorders and controllers in both pneumatic and electric control actions. Accessories shown in the bulletin include electrodes and assemblies, manual and automatic switching stations, connector boxes and a complete line of final control elements for adding reagents to the process.



For More Details Circle No. 176—Page 239

FORK TRUCK MAINTENANCE: Lewis-Shepard Products Inc., Service Dept., Watertown, Mass.—Maintenance chart for electric fork trucks shows the proper steps to be taken for the daily, weekly and monthly inspections. Each chart covers 8 weeks of operation.

For More Details Circle No. 177—Page 239

SAW BLADE SELECTION: Victor Saw Works Inc., Middletown, N. Y.—Wall chart tabulates metal cutting data on hand, power and band saws. Three tables simplify blade selection.

For More Details Circle No. 178—Page 239

SHELL MOLDING: Shell-O-Matic Inc., 26-32 Avenue L, Newark 5, N. J.—Bulletin illustrates the process of making a shell mold on an automatic shell molding machine.

For More Details Circle No. 179—Page 239

COLD CATHODE LIGHTING: Celine Inc., St. Charles, Ill.—Advantages of cold cathode industrial light-

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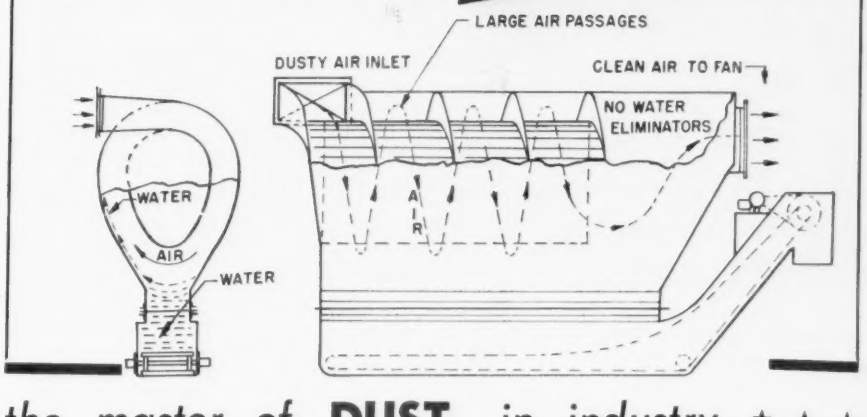

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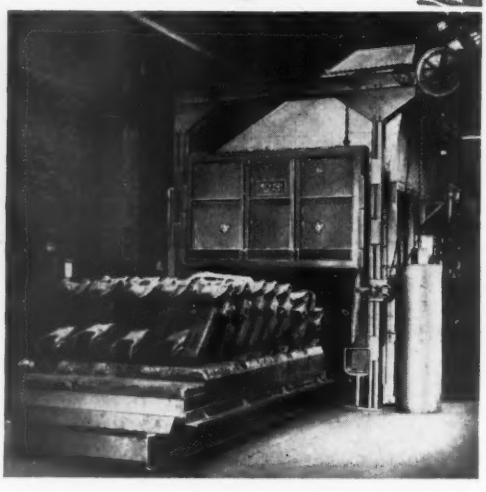

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ing are described in new bulletins. Lamp life is stated to be 15,000 to 25,000 hr.

For More Details Circle No. 180—Page 239

WHEEL AND TOOL SELECTION: Metal Removal Co., 1546 North Orleans, Chicago 10, Ill.—New 40-page catalog, "Abrasive and Cutting Tool Catalog," includes charts and text to aid selection of the correct wheel or tool. A discount schedule makes pricing of the various items simple and convenient.

For More Details Circle No. 181—Page 239

RADIATION AND PROTECTION: Bar-Ray Products Inc., 209-25th St., Brooklyn 32, N. Y.—Catalog W-54 is a source of reference on radiation and protection. Included are detailed specifications and drawings on protective materials. Other sections cover x-ray accessories, film processing systems and refrigeration apparatus. The illustrated 56-page book considers industrial inspection and deals with all phases of radiation protection, including isotope equipment, radiation resisting lead-glass fabric, radiation monitors, etc.

For More Details Circle No. 182—Page 239

BLASTING BARREL: Pangborn Corp., Hagerstown, Md.—Bulletin 225 gives complete specifications and dimensions of barrel blast machines from 1½ cu ft to 27 cu ft. Data on motor specifications, maximum weight per piece, and maximum weight per load add to the booklet.

For More Details Circle No. 183—Page 239

PROTECTIVE CLOTHING: Pulmosan Safety Equipment Co., 644 Pacific St., Brooklyn 17, N. Y.—New clothing booklet describes asbestos gloves and mittens, chrome leather clothing and vinyl clothing.

For More Details Circle No. 184—Page 239

JOINTERS AND PLANERS: Oliver Machinery Co., 1025 Clancey Ave., N. E., Grand Rapids, Mich.—Illustrations show features and use of wood-working machines. Specifications of machines are included.

For More Details Circle No. 185—Page 239

MOTOR STARTERS: Electric Controller & Mfg. Co., 2700 East 79th St., Cleveland 4, O.—Motor starters having short circuit protection for 2200-5000 volt systems are described in booklet 1062.

For More Details Circle No. 186—Page 239

ELECTRIC FORK TRUCK: Clark Equipment Co., Industrial Truck Division, Battle Creek, Mich.—Brochure illustrates the electric fork lift truck with a special section on fork truck attachments.

For More Details Circle No. 187—Page 239

HOIST TRACTOR: Detroit Hoist & Machine Co., 8220 Morrow St., Detroit 11, Mich.—Convenient draw-bar

attaches a monorail tractor to an existing hoist or other hand traveled equipment converting it into an electrically powered unit. Bulletin 833 illustrates typical installations and includes complete specifications.
For More Details Circle No. 188—Page 239

ENGINE EXHAUST PURIFIERS: Oxy-Catalyst Inc., Wayne, Pa.—Harmful exhaust fumes from internal combustion engines are removed by catalytic exhausts which take the place of standard mufflers. Efficiency and operation of the unit are described in a four page folder.
For More Details Circle No. 189—Page 239

PRODUCT CATALOG: Link-Belt Co., 307 North Michigan Ave., Chicago 1, Ill.—Standard products catalog 950, containing 340 pages, provides easy and rapid selection. Products covered are chains and sprockets, gear drives, transmission products, conveyor components and other items.
For More Details Circle No. 190—Page 239

SAFETY EQUIPMENT: Mine Safety Appliances Co., 201 North Braddock Ave., Pittsburgh 8, Pa.—Help in selecting safety and rescue equipment for use in emergencies is given by booklet 5000-4. Each piece of equipment is pictured.
For More Details Circle No. 191—Page 239

MOTORIZED REDUCERS: Falk Corp., 3001 West Canal St., Milwaukee 8, Wis.—Selection tables, dimensions, weights, overhung load ratings and thrust capacity ratings for gear drives up through 75 hp rating are consolidated in bulletin 3100. A foldout section bound in the middle of the book contains illustrated information on mounting positions, low-speed shaft connections, product features and pictures of typical applications.

For More Details Circle No. 192—Page 239

TECHNICAL PRODUCTS BOOK: Brown-Allen Chemicals Inc., P. O. Box 1, Port Richmond, Staten Island 2, N. Y.—Expanded line of processed marine and vegetable oils is covered in a newly revised technical products book. Background information on the company is included.
For More Details Circle No. 193—Page 239

MATERIAL HANDLING: Republic Steel Corp., Advertising Div., 3100 East 45 St., Cleveland 27, O.—Illustrated catalog ADV. 620 describes steel boxes, skids, pallets, foundry flasks and other products.
For More Details Circle No. 194—Page 239

TEMPERATURE CRAYONS: Tempil Corp., 11 West 25th St., New York 10, N. Y.—Use of temperature-sensitive crayons of calibrated melting points is described in a revised instruction sheet.
For More Details Circle No. 195—Page 239

STEEL CHAIN: Joseph T. Ryerson & Son Inc., Box 8000-A, Chicago 80, Ill.—Specifications and working load limits for alloy steel chain especially manufactured for lifting purposes are given in an illustrated folder.
For More Details Circle No. 196—Page 239

GRINDING DISCS: Manhattan Rubber Div., Raybestos-Manhattan Inc., Passaic, N. J. — Reinforced grinding discs for portable grinders and sanders are described in bulletin 6901-E. Sizes, grades and recommended operating speeds are listed.
For More Details Circle No. 197—Page 239

REFRACTORY RAMMING MIX: Alpha-Lux Co., 155 John St., New York 7, N. Y.—Advantages of high fusion point refractory ramming mix in preventing slag inclusions in malleable and steel castings are given in bulletin AL-35.
For More Details Circle No. 198—Page 239

COMPRESSOR MAINTENANCE: Advertising & Sales Promotion Dept., Worthington Corp., Harrison, N. J.—Mailer L-676-M1 gives preventive maintenance tips on vertical water-cooled compressors. Reasons for operating troubles are described.
For More Details Circle No. 199—Page 239

HYDRAULIC CLASSIFIER: Deister Concentrator Co., 901-935 Glasgow Ave., Ft. Wayne, Ind.—Bulletin 200 gives the uses, design, description, operation and advantages of constriction plate classifiers used in the sizing of sand.
For More Details Circle No. 200—Page 239

FLUORESCENT GUIDE: Sylvania Electric Products Inc., 60 Boston St., Salem, Mass.—Information on what fluorescent lighting is, its advantages, lamp sizes and colors, accessories and other pertinent data are given in a new reference digest.
For More Details Circle No. 201—Page 239

PYROMETER ACCESSORIES: Illinois Testing Laboratories Inc., Room 511, 420 North LaSalle St., Chicago 10, Ill.—Specifications, performance data and other information make up bulletin 4181.
For More Details Circle No. 202—Page 239

DIELECTRIC CORE OVENS: Foundry Equipment Co., Dept. D12, 1831 Columbus Rd., Cleveland 13, O.—Bulletin 654 describes and illustrates the advantages and operating features of dielectric core ovens.
For More Details Circle No. 203—Page 239

LIFTING UNITS: Economy Engineering Co., 4511 West Lake St., Chicago 24, Ill.—Series of lifting units, elevating table, drum trucks and other materials handling devices are pictured in a new catalog.
For More Details Circle No. 204—Page 239

VAPOR REMOVAL: Selas Corp. of America, Erie Ave. and D St., Philadelphia 34, Pa.—Unit providing continuous removal of petroleum vapors, dirt and liquids from air and gases is described in bulletin SC-1047.
For More Details Circle No. 205—Page 239

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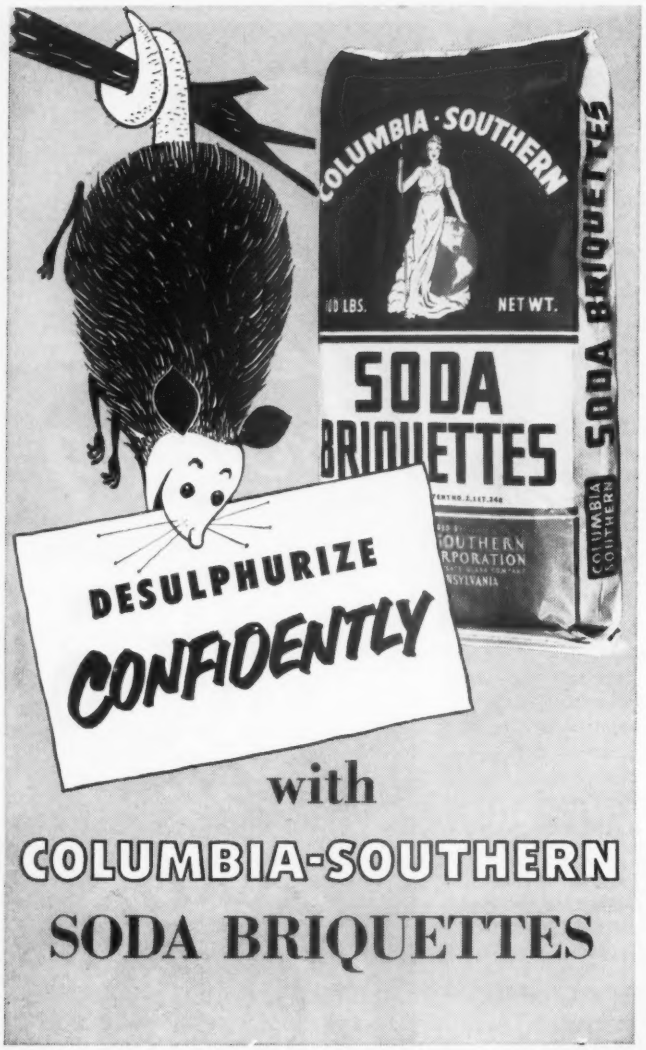

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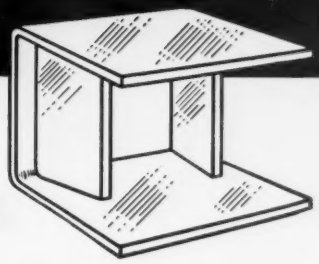

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Comparative performances of TISCO Blades		
USER**	TISCO BLADES	COMPETITOR'S
Customer A	78 hours per set	44 hours
Customer B	62 hours per set	30 hours
Customer C	114 hours per set	36 hours
Customer D	101 hours per set	16 hours
Customer E	192 hours per set	38 hours

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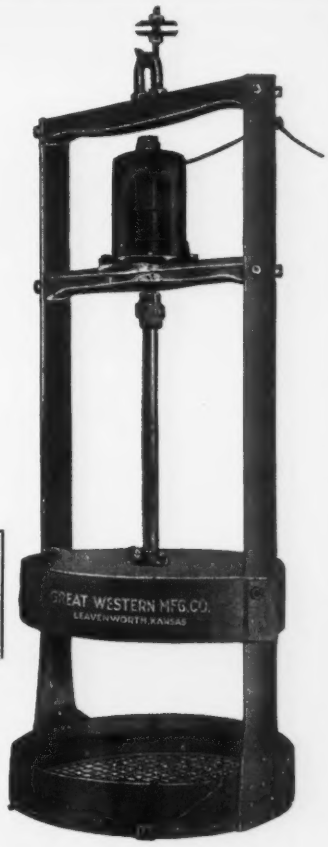

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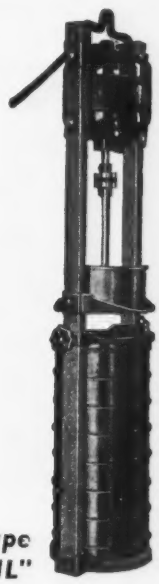

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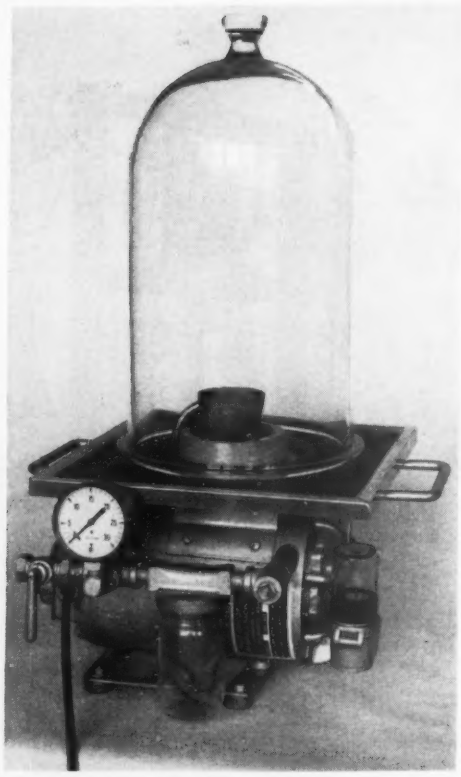

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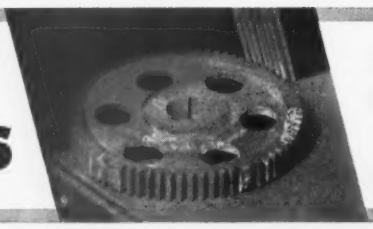

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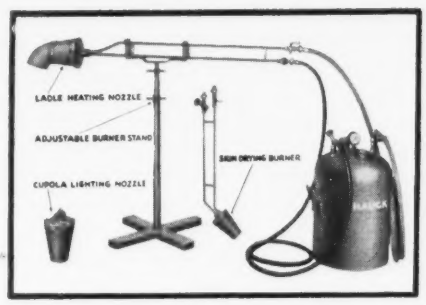

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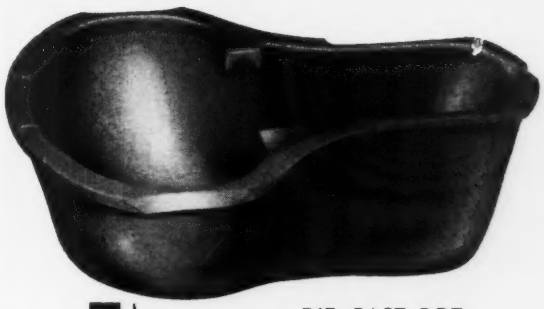

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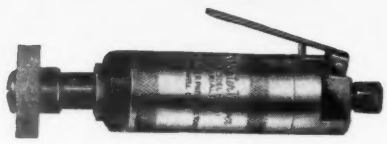

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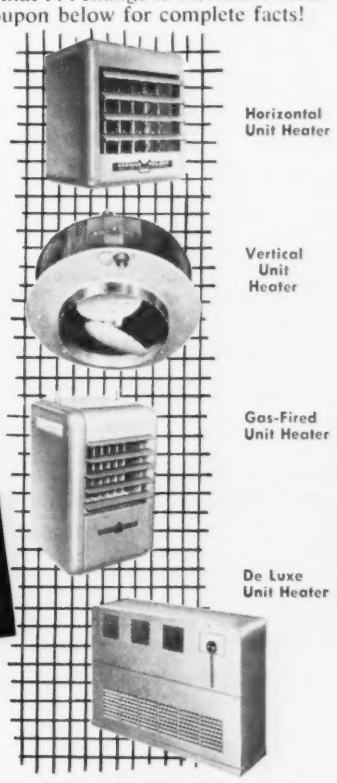

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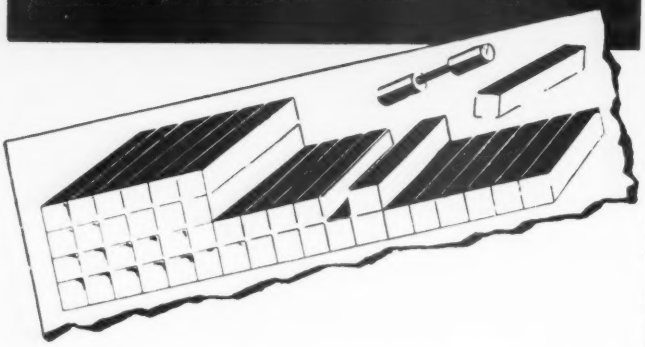

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	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Y.S.	22.5	20.0	21.2	20.6	20.5	22.0	20.8	21.0	21.8	22.5	23.0	23.4	23.0	25.0	23.8	22.5	23.5	24.6
T.S.	38.3	33.0	33.1	32.7	33.8	36.0	33.8	32.5	33.5	34.5	34.0	37.2	37.8	39.0	36.8	36.5	36.7	40.0
El.	12.5	10.0	6.0	4.0	7.5	7.5	8.0	7.0	7.0	7.5	7.0	8.0	8.5	8.5	7.5	8.0	7.5	10.0

	30	29	28	27	26	25	24	23	22	21	20	19
Y.S.	22.0	23.0	22.5	21.5	22.5	23.5	22.5	23.5	23.5	23.8	22.8	23.8
T.S.	36.3	35.3	35.3	35.0	35.0	37.3	34.5	32.0	32.5	32.5	35.0	38.3
El.	10.0	6.0	9.0	7.5	7.5	6.0	5.0	5.0	5.0	5.0	7.5	7.5

	31	32	33	34	35	36
Y.S.	23.0	22.8	22.5	24.0	23.5	23.0
T.S.	36.3	33.3	32.5	32.5	36.3	39.0
El.	8.0	5.0	5.0	5.0	7.0	8.5

	42	41	40	39	38	37
Y.S.	23.3	23.7	23.0	23.2	23.0	22.5
T.S.	33.2	37.1	36.4	37.3	38.0	40.8
El.	3.0	8.0	6.5	6.5	11.0	11.0

Separately-Cast Test Bar Properties		
NAT. AGED 21 DAYS	Y.S.	23500
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T.S.	40,800	32,500	35,500
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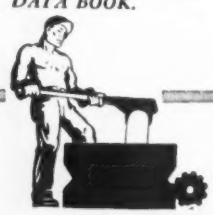

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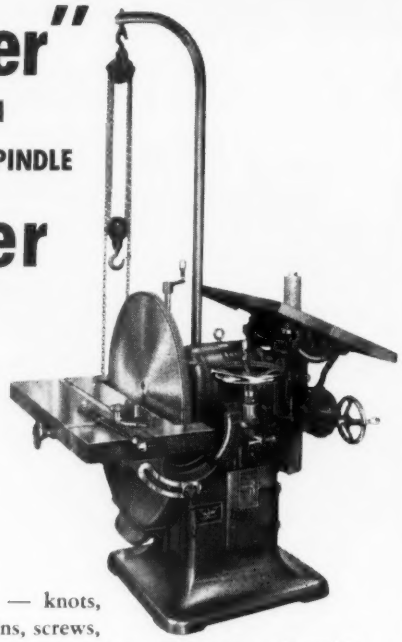

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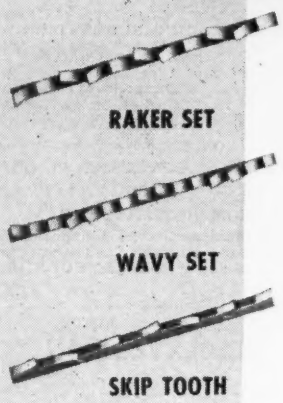

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Statement required by the Act of August 24, 1912, as amended by the Acts of March 3, 1933, and July 2, 1946 (Title 39, United States Code, Section 233) showing the ownership, management, and circulation of FOUNDRY, published monthly, at Cleveland, Ohio, for October 1, 1954. 1. The names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, The Penton Publishing Company, 1213 West Third St., Cleveland 13, Ohio. Editor, Frank, G. Steinebach, 1213 West Third St., Cleveland 13, Ohio. Managing editor, William G. Gude, 1213 West Third St., Cleveland 13, Ohio. Business manager, George A. Pope, 1213 West Third St., Cleveland 13, Ohio. 2. The owner is The Penton Publishing Company, 1213 West Third St., Cleveland 13, Ohio. Names and addresses of stockholders owning or holding 1 percent or more of total amount of stock: Edwin C. Barringer, Washington, D. C.; Samuel E. Bool, Cleveland, Ohio; Conbat Co., Santa Barbara, Calif.; J. R. Dawley, Cleveland, Ohio; Mrs. Agnes T. Hays, Cleveland, Ohio; George O. Hays, Cleveland, Ohio; Russell C. Jaenke, Cleveland, Ohio; Leona F. Jasper, Pittsburgh, Pa.; A. L. Klingeman, Cleveland, Ohio; J. D. Pease, Sr., Mount Dora, Florida; Francis O. Rice, Cleveland, Ohio; E. L. Shaner, Cleveland, Ohio; Charles J. Stark, Cleveland, Ohio; Penelope M. Stark, Cleveland, Ohio; The Wean Engineering Co., Inc., Warren, Ohio; Edith L. Werner, Cleveland, Ohio; Grace Whelan, Santa Barbara, Calif. 3. The known bondholders, mortgagees, and other security holders owning or holding 1 percent or more of total amount of bonds, mortgages, or other securities are New England Mutual Life Insurance Co., 501 Boylston Street, Boston 17, Mass. 4. Paragraphs 2 and 3 include, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting; also the statements in the two paragraphs show the affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner. Frank G. Steinebach. Sworn to and subscribed before me this 27th day of September, 1954. (Seal) Joseph P. Lipka (My commission expires Sept. 9, 1955)

TWO SIMPLE REASONS WHY!

● We will guarantee—in writing—that you'll save money on your blast cleaning costs when you use Permabrasive* shot and grit instead of conventional annealed abrasives. Yes sir, a guaranteed savings in writing.

We can afford to make this statement, because Permabrasive shot and grit are better. They are better for two simple reasons: (1) Permabrasive is made from metal of the proper analysis. Its carefully controlled chemical composition insures uniform response to heat treatment and maximum resistance to breakage. (2) Permabrasive is heat treated properly. A continuous processing method insures complete heat treatment of each abrasive particle, resulting in a high degree of uniformity and assuring maximum abrasive durability.

Permabrasive will save you money and we can prove it. Write the nearest Hickman, Williams office for proof and a complimentary copy of "A Primer on the use of shot and grit."

*Licensed under U. S. Patent No. 2184926, U. S. Application No. 619602

PERMABRASIVE* SHOT AND GRIT IS *PRODUCED EXCLUSIVELY BY*

H W REG U.S. PAT. OFF.

THE NATIONAL METAL ABRASIVE CO.
CLEVELAND, OHIO

AND SOLD EXCLUSIVELY BY

HICKMAN, WILLIAMS & CO.
(INCORPORATED)

CHICAGO • DETROIT • CINCINNATI • ST. LOUIS • NEW YORK
CLEVELAND • PHILADELPHIA • PITTSBURGH • INDIANAPOLIS

CLASSIFIED ADVERTISING

Help Wanted

FOUNDRY ENGINEER

For progressive foundry in Indiana. Mechanical graduate not necessary. Highway and building construction background desirable. To work on new machinery installation. Building changes. Machinery efficiency, new methods and quality control. Write giving full details of personal background, experience, and starting salary expected.

BOX 358

FOUNDRY **CLEVELAND 13, OHIO**

CUSTOMER CONTACT
INSPECTION SUPERVISOR

For

Large Production Mechanized Foundry
In The Midwest

Great Opportunity For The Future
For a Man Willing To Work In A
Rapidly Expanding Organization

Must Have Ability To Meet People
And
Be Able To Travel Part Time

Experience In Inspection, Pattern Work
Or Engineering Would Qualify

Write Stating Age, Personal Background
And Past Experience

Box 349

FOUNDRY **CLEVELAND 13, OHIO**

HELP WANTED

STEEL FOUNDRYMAN AS CONTROL SUPERVISOR. EXPERIENCED IN RIGGING, CHILLING AND MOLDING OF STEEL CASTINGS. ¼ LB. TO 2000 LB., BY ELECTRIC PROCESS. WIDE EXPERIENCE REQUIRED.

WILL ARRANGE INTERVIEW WITH QUALIFIED APPLICANTS.

LOCATION: CENTRAL OHIO.

BOX 323

FOUNDRY **CLEVELAND 13, OHIO**

O P P O R T U N I T Y

as

SERVICE ENGINEER

for

MELTER AND METALLURGIST

Large merchant producer of nationally known foundry coke with unexcelled reputation has opening with unusual opportunities for a metallurgist with adequate melting experience for sales and cupola melting service over large territory. Applications treated confidentially, and should include education, experience, age and salary expected.

BOX 348

FOUNDRY **CLEVELAND 13, OHIO**

SALES ENGINEER

PREFERABLY IN EARLY THIRTIES, FOR DUTIES IN NATIONAL ORGANIZATION WITH WIDE RANGE OF FOUNDRY MATERIALS AND EQUIPMENT. SALES EXPERIENCE NOT ESSENTIAL BUT FOUNDRY EXPERIENCE IN SAND, MOLDING, OR METALLURGY REQUIRED. HIGHER EDUCATION CONSIDERED DESIRABLE. DUTIES INVOLVE TRAVEL.

BOX 355

FOUNDRY **CLEVELAND 13, OHIO**

PATTERN SHOP SUPERVISOR

Opportunity in Pacific Northwest for aggressive, experienced patternmaker. Shop employs 8 to 10. Production and loose patterns manufactured. Operated by steel and gray iron foundry. Please provide work history and pay expected in first letter. Address: Box 321, FOUNDRY, Cleveland 13, Ohio.

METALLURGIST

B.S. degree from recognized engineering school. At least three years' experience in light alloy foundry, familiar with sands, melting procedures, gating, rigging and Heat Treatment. Must have ability to head staff of foundry metallurgists and technicians.

BOX 334

FOUNDRY **CLEVELAND 13, OHIO**

PLANT ENGINEER

MUST HAVE EXPERIENCE IN STEEL FOUNDRY TO TAKE CHARGE OF BOTH CONSTRUCTION AND ALL MAINTENANCE. IN REPLYING GIVE COMPLETE INFORMATION WHICH WILL BE HELD IN STRICT CONFIDENCE BY A SINGLE EXECUTIVE.

BOX 293

FOUNDRY **CLEVELAND 13, OHIO**

FOUNDRY SUPERINTENDENT

Thoroughly experienced in low scrap close tolerance aluminum aircraft sand castings. Capable handling and training men. Great opportunity for right man to take charge of fast growing foundry in St. Louis area. References and complete information in first letter.

BOX 356

FOUNDRY **CLEVELAND 13, OHIO**

ESTIMATING ENGINEER

To work for a growing precision investment casting company in southern New Hampshire. Would prefer training in this field, but any casting experience would be considered. Modern plant and equipment. Engineering degree desirable. Age range to 35 years. Write giving experience, education, age and salary requirements. Address: Box 375, FOUNDRY, Cleveland 13, Ohio.

FOUNDRYMAN

Young man in large construction casting foundry. Must have sand and metal control experience. Foundry engineering experience also helpful. Eastern location with opportunity for advancement. Address: Box 373, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY FOREMAN

Small gray iron job shop located in East Tennessee in operation 34 years. Prefer man 35-40 years old with ability to supervise all phases of production. State age, education, experience, references and salary expected. Address: Box 347, FOUNDRY, Cleveland 13, Ohio.

CENTRIFUGAL CASTING SUPERVISOR

Experience in producing high alloy tubes in both sand and permanent type molds.
Good opportunity for a progressive thinking man with an old established foundry located in the midwest.

BOX 353

FOUNDRY **CLEVELAND 13, OHIO**

CLEANING ROOM SUPERINTENDENT

Midwestern well established steel foundry needs superintendent to take charge of 40 man crew cleaning operation. Address: Box 333, FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

CASTING SALESMAN

Experienced in patterns, foundry production, contact selling and sales management. Ferrous, nonferrous, steel. Prefer Ohio. Shall be pleased to advise education and complete business experience. Address: Box 363, FOUNDRY, Cleveland 13, Ohio.

PLANT ENGINEER

Registered professional engineer. Age 52. Twenty-nine years experience in highly mechanized gray iron foundry, cupolas, electric furnaces and aluminum melting. All phases of plant layout, mechanization, short cuts in production methods, material handling, construction and maintenance. Also available in consulting capacity. Address: Box 352, FOUNDRY, Cleveland 13, Ohio.

SUPERINTENDENT

High frequency induction furnace superintendent seeking position. Fourteen years' experience in production of stainless steel and alloy castings, twelve years as analytical chemist. Certificates in metallurgy. Address: Box 362, FOUNDRY, Cleveland 13, Ohio.

SUPERINTENDENT

Twenty-two years' practical foundry experience. Gray iron, brass and aluminum. Economy, quality-minded, above all profit-minded. Address: Box 319, FOUNDRY, Cleveland 13, Ohio.

METALLURGIST

College graduate, 25 years' experience in cast iron and steel foundries, mostly plant control, some research. Cast iron and electric steel melting, heat treating, sand control, radiography, metallography, inspection, physical and chemical testing, materials specification. Good recommendations. Preference—East, Mid-West, Canada. Address: Box 360, FOUNDRY, Cleveland 13, Ohio.

SUPERINTENDENT OF MAINTENANCE

Thirty-eight years old, technical schooling. Desire position with mechanized foundry. Experienced in preventive maintenance having reduced costs and increased production. Good labor relations. Twelve years' supervisory experience. Address: Box 330, FOUNDRY, Cleveland 13, Ohio.

EXECUTIVE

Experienced in all phases of foundry operation and management with thorough knowledge of each shop process, engineering, metallurgy, cost estimating and accounting, sales and industrial relations. Technical graduate. Excellent recommendations. Address: Box 366, FOUNDRY, Cleveland 13, Ohio.

SUPERVISOR

Twenty-five years' experience in production metallurgy of melting of steel, stainless, nodular irons, etc., in electric arc and induction furnaces. Production control of chemical elements for specification metals. Address: Box 359, FOUNDRY, Cleveland 13, Ohio.

IF YOU NEED

A hard working and progressive foreman with an alert and inventive mind in your foundry answer this ad. Journeyman. Mechanical Engineer. Seven years' experience in gray iron (Jobbing and production) foundries and some steel and nonferrous. Married. Age 31. Will go anywhere. Address: Box 368, FOUNDRY, Cleveland 13, Ohio.

CLASSIFIED ADVERTISING

Positions Wanted

WEIGHT ESTIMATING

Estimating of casting weights furnished by return mail. Accurate, reliable and confidential service. Automatic calculator equipment. Nominal fee. Send blueprints to: CHARLES E. ROLAND, ITASCA, ILLINOIS.

STEEL FOUNDRYMAN

Supervisory capacity with twenty years' experience in all phases steel foundry. Producing steel castings ranging from one pound to three tons. Good knowledge of foundry methods. Familiar with heading and gating and rigging of patterns for machine sandslinger production, sand control. Married. Address: Box 268, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY EXECUTIVE

Iron or steel, seventeen years in management with experience in sales, labor relations. Production and particular emphasis on metallurgy, melting, heat treating, sand control, rigging and methods. Presently employed. Address: Box 369, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY EXECUTIVE

Thoroughly experienced in the management of gray iron production or jobbing foundries. Qualified to show you a highly efficient and low cost operation. If you are interested. Address: Box 367, FOUNDRY, Cleveland 13, Ohio.

WORKING FOREMAN

Thirty years' experience, jobbing work, iron, brass, aluminum. All phases foundry work. Prefer small shop, West Coast, age 45. Address: Box 312, FOUNDRY, Cleveland 13, Ohio.

FOREMAN — WOOD PATTERNMAKING OR PURCHASING PATTERNS AND CASTINGS, EXPEDITING AND COORDINATING.

Years of experience in the medium to heavy machine tool industry. Iron and steel foundry background. Address: Box 365, FOUNDRY, Cleveland 13, Ohio.

GENERAL MANAGER

Mature, profit-minded, aggressive. Successfully managed five companies—three taken out of the red. Trained two successors, both made good. Qualified to carry complete administrative responsibility and develop all profitable possibilities. Excellent experience foundry, machinery and related lines. Address: Box 297, FOUNDRY, Cleveland 13, Ohio.

SUPERINTENDENT OR GENERAL FOREMAN

Practical foundryman, twenty-eight years' experience in gray iron and nonferrous, jobbing and production shops. Fifteen years on supervision, well versed in all departments. Available immediately. Good references. Address: Box 338, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY EXECUTIVE

Twenty years' experience in top foundry management, industrial relations, sales estimating, production and cost control in gray iron foundries producing heavy jobbing and production castings. Prefer Central West. Excellent references. Address: Box 371, FOUNDRY, Cleveland 13, Ohio.

Representatives Wanted

SALES REPRESENTATIVES

Resident men to handle volume accounts for mechanized malleable iron foundry on commission basis. Territories available in New York State, Ohio, West Virginia, Virginia and North Carolina. Write complete personal and sales data in confidence.

BOX 361

FOUNDRY CLEVELAND 13, OHIO

SALES REPRESENTATIVES

Manufacturer of briquetted cupola flux, with excellent distribution throughout Central States, looking for sales representation east of Ohio. Correspondence invited.

WEAVER BLOCK COMPANY
16125 CLEOPHUS STREET
ALLEN PARK, MICHIGAN

SALES REPRESENTATIVE

To handle accounts for patterns on commission basis. Open territories available. Write complete personal and sales data in confidence. Address: Box 374, FOUNDRY, Cleveland 13, Ohio.

Representatives Wanted

SALES REPRESENTATION WANTED

Largest new process casting foundry in the country is shifting sales effort to use manufacturers' representative. Most territories open. Prefer young energetic man with engineering background and allied lines. Send all information in first letter including lines carried and volume of sales. Main quality desired is willingness to work. Address: ALCALOY, INC., 13124 SHAKER SQUARE, CLEVELAND 22, OHIO

INDUSTRIAL SALESMAN OR SALES TRAINEE

Age 25-35 for established supplier furnishing basic raw material to the iron and steel industry—metallurgical education or knowledge of iron and steel melting helpful, but will consider others. Will require travel with headquarters in Ohio. Salary commensurate with experience, plus expenses. Address: Box 350, FOUNDRY, Cleveland 13, Ohio.

SALES REPRESENTATIVES WANTED

Aluminum Permanent Mold Midwest foundry wants qualified casting salesmen. Commission basis. Prefer men with established customer relations. Address: Box 364, FOUNDRY, Cleveland 13, Ohio.

SALARIED REPRESENTATIVE

Resident of New England to establish and handle volume accounts in New England territory for malleable iron castings. Give complete resume including salary desired.

BOX 354

FOUNDRY CLEVELAND 13, OHIO

SALES REPRESENTATIVE

To sell foundry facings, supplies and refractories. Foundry experience necessary, sales experience helpful. Travel Eastern Pennsylvania, Western New York, Northern Maryland, should be centrally located in territory. Write giving full particulars, including age, draft status, compensation expected, etc. Address: Box 351, FOUNDRY, Cleveland 13, Ohio.

METALS, MINERALS, CHEMICALS

Salesman, with industrial clientele, wanted on high commission. Write complete personal and sales data in confidence. Include photo. BRAM CHEMICAL CO., 820-65th AVE., PHILADELPHIA 26, PENNSYLVANIA.

Representatives Available

SALES REPRESENTATION

Established sales organization calling on the automobile industry desires to add a line of gray iron castings to their Detroit and Michigan area.

BOX 331

FOUNDRY CLEVELAND 13, OHIO

OPPORTUNITY

OPPORTUNITY

FOR MEN WITH CUPOLA EXPERIENCE TO SHOW GRAY IRON FOUNDERS A SIMPLE NONTECHNICAL CONTROL SYSTEM WHICH CONSISTENTLY PRODUCES QUALITY IRONS CONFORMING TO VARIOUS REQUIREMENTS. STRAIGHT COMMISSION BASIS WHICH CONTINUES DURING PATENT LIFE.

BOX 372

FOUNDRY CLEVELAND 13, OHIO

Capacity Wanted

CAPACITY WANTED

Have patented soil pipe which can be installed 3 times faster. Want capacity on possible 3 shift basis. Would like to hear from foundry owners with brains and ability.

ROY BATCHLER
UNIVERSITY BUILDING
DENVER, COLORADO
PH. AL 5-2807—GL 5-6151

Wanted-To-Buy

WANTED

one 6-ton geared Tea Pot Ladle.

CRUCIBLE STEEL CASTING COMPANY
2850 S. 20th STREET
MILWAUKEE 15, WISCONSIN

WANTED TO BUY

1—Used B & P Speedmullor, model 30 or 40, with skip hoist. State serial numbers of mullor and motors, condition, and lowest cash price.

BOX 318

FOUNDRY CLEVELAND 13, OHIO

MACHINERY WANTED

Induction Furnaces, Screens, Simpson Mixers, Riehle Compression Testing Machines, Pulverizers, Grinders, Conveyors. Address: CONDENSER SERVICE & ENGINEERING CO., INC., HOBOKEN, NEW JERSEY, BA 7-0600.

MIXERS WANTED

Used Simpson Intensive Sand Mixers. State size, condition and lowest cash price or immediate acceptance. Address Box 578, FOUNDRY, Cleveland 13, Ohio.

WANTED

In good condition, 1 Simpson Portomuller. Motor 3 phase, 220 V-60 cycle. Address: CARBONDALE GRATE-BAR CO., CLAY AVENUE, SCRANTON, PA.

Foundries For Sale

GRAY IRON FOUNDRY FOR SALE

Building two years old. Well equipped jobbing shop. Room for 14 molders—10 working now. Producing approximately 7 tons daily. Good labor relations.

BOX 309

FOUNDRY CLEVELAND 13, OHIO

FOR SALE

Quincy, Illinois, has no foundry. I own a new modern 40,000 sq. ft. foundry building with 3 cupolas, railroad, river and truck transportation. Will sell or rent very cheap.

S. M. HOMAN
7205 EXCHANGE AVENUE
CHICAGO 49, ILLINOIS
REGENT 4-1242

FOR SALE

Brick and steel foundry, Southern Illinois, 160 x 320 feet, overhead monorail, water transportation available. Ideal for mechanized operation, contains equipment. Address: Box 326, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY—FERROUS OR NONFERROUS

Building 20,000 square square feet with an adjacent lot. Is on railroad siding. Employed 45. Shower rooms. Equipped for going business. Located Tri-City area. Address: Box 370, FOUNDRY, Cleveland 13, Ohio.

Employment Service

FOUNDRY PERSONNEL SPECIALISTS
National Placement and Procurement of

GENERAL AND PLANT MANAGERS, PLANT SUPERINTENDENTS, FOREMEN—ALL DEPARTMENTS, METALLURGISTS, ENGINEERS, CONTROLLERS, ACCOUNTANTS, SALESMEN, SALES MANAGERS, PERSONNEL DIRECTORS, PURCHASING AGENTS.

Confidential Inquiries Invited
From Employers and Qualified Applicants.

For Fast Competent Assistance Contact

JOHN COPE, DIRECTOR — **37 S. WABASH, CHICAGO 3, ILL.**
IMPERIAL PERSONNEL — **FRANKLIN 2-4233**

SALARIED PERSONNEL

$3,000-$25,000. This reliable service, established 1927, conducts confidential negotiations for high grade men who seek a change of connection under conditions assuring if employed full protection to present position. Send name and address only for details. Personal consultation invited. Address: JIRA THAYER JENNINGS, 241 ORANGE STREET, NEW HAVEN 10, CONN.

Foundries For Sale

17,000 SQ. FT. FOUNDRY

FOR SALE OR LEASE

Gray Iron—Aluminum—Bronze

- 80' x 210' BUILDING
- ON 5 ACRES
- RAILROAD SPUR
- 6-TON CAP. CUPOLA
- 200 TONS PER MONTH

PRESENT OWNER WILL TAKE 25% TO 50% OF PRODUCTION

Present owner selling in order to concentrate on manufacturing. Ample business available to take up remaining 50% to 75% of production.

CONTACT: FRANK WHEATLEY, JR.

FRANK WHEATLEY PUMP AND VALVE MFR.

HALE STATION, SAND SPRINGS ROAD

TULSA, OKLAHOMA

FOUNDRY FOR SALE

IRON FOUNDRY producing machinery castings up to 7 tons. Excellent equipment for quantity production of small and medium castings. Capacity 20 tons per day. Over 100,000 sq. ft. building and 8 acres land. Machine shop.

EDWARD H. ZOLL

FOUNDRIES SOLD AND LEASED

790 BROAD STREET — **NEWARK 2, N. J.**

FOR SALE OR LEASE

Well equipped brass and aluminum foundry in central Indiana. Now operating. With living quarters. Address: Box 327, FOUNDRY, Cleveland 13, Ohio.

For Sale

FOR SALE

TURBO BLOWERS WITH MOTORS

CFM	PRESS.	MAKE	CFM	PRESS.	MAKE
6000	32 oz.	Ing.-Rand	675	16 oz.	No.Am.
4600	32 oz.	Ing.-Rand	660	20 oz.	A-B
4050	16 oz.	No. Am.	500	10 oz.	No.Am.
3500	40 oz.	Spencer	400	4.3 oz.	Spencer
2800	1 oz.	Spencer	340	20 oz.	A-B
2700	16 oz.	Spencer	320	12 oz.	Spencer
2500	7 oz.	Sturt.	180	15 oz.	Spencer
2000	2½ oz.	Spencer	9000	6" SP	Northern
2000	1 oz.	Spencer	2500	½" SP	American
1300	16 oz.	Spencer	2344	2" SP	Clarage
1150	20 oz.	No.Am.	1100	4½" SP	Bayley

THE MOTOR REPAIR & MFG. CO.
1552 HAMILTON AVE.
CLEVELAND 14, OHIO

SAVE $5,000

#918 Johnston & Jennings Jolt-Clamp-Leveler, Rollover Pattern Draw, 44" x 54" table, 18" draw, Automatic Take-off, Excellent Condition, No Pit Required—Price $2250.00.
#605 Osborn Jolt, Rollover Pattern Draw, 54" x 24" table, 12" Flask size—10" draw, Portable, Like New $750.00.
Dielectric Core Ovens—Model 900A and Model 1800A; Conveyor Type—1949, Will set up in your shop.
Osborn Core Blowers—Models 91, 94, and 193
Herman Jar Rollover & Pattern Draw; 1944; 48" x 144"; 10,000# Series.
Int'l. JDP Pattern Draw; 600 lb. 8" Draw.
#2047 Osborn Jolt Rollovers.
#275J Osborn Jolt Squeezers—$125.00 each.
3,000 lb. Aluminum Fisher Hydraulic Tilting Furnace.

BALCHER MACHINERY COMPANY
6020 EUCLID AVENUE
CLEVELAND 3, OHIO
EXPRESS 1-8930

MACHINERY FOR SALE

One Simplicity Gyrating Screen Shakeout Machine, Model D, size 5 feet by 8 feet, floor area 15 feet by 20 feet—with 3 phase, 25 cycle, 440 volt operating motors. Reason for selling—too small for our use. In use now and available after January 1, 1955.

GARDNER-DENVER COMPANY
QUINCY, ILLINOIS

HEAT TREAT FURNACE

Lindberg Engineering type EH 4860 recirculating pit type furnace. 48 inches in diameter and 60 inches deep for operation at 1250 degrees fahrenheit maximum. Heating circuit 100 KW, 440 V three phases. Control circuit 110 volt single phase. Control instruments are a Wheelco Capacitrol, Wheelco Limitrol and Wheelco Inputrol. Address: ENTERPRISE BRASS WORKS, MUSKEGON, MICHIGAN.

FOR SALE

1—Beardsley & Piper Motive Jr. Sandslinger. Serial #MJ-255-513. New in 1951. Used only 6 months, and is like new. Will sell for $14,500.00 — f.o.b. Alpena, Michigan. Address: **THUNDER BAY MFG. CORPORATION, ALPENA, MICHIGAN, OR PHONE ALPENA 834.**

FURNACES FOR SALE

Ten used heat treating furnaces and two 7-ton gantry cranes. Good condition, priced to sell. Address: BAER STEEL PRODUCTS, INC., BOX 1428, BOISE, IDAHO.

FOR SALE

Air Compressor, 198 ft. Gardner Denver, 40 HP, 220/440 volt, Model WB2, Direct drive. Latest Model. Like new. $1250. Address: STANHOPE, 60 East 42nd Street, New York, New York.

For Sale

FOR SALE

MOLDING MACHINES
1—Herman, Jolt, Rollover Draw, 6000#, 40" x 60" table.
1—Herman, Jolt Stripper, 48" x 54" table.
2—International, Jolt, Rollover Draw, 24" x 10G, Stationary.
2—International, Jolt, Rollover Draw, 20" x 8-G, Portable.
1—Plain jolt machine, 60" x 72" table, 16" cylinder.
1—#276 PJ Osborn jolt squeezer.
2—No. 275 Osborn jolt squeezers.
2—SPO #611B Stationary Oscillating Jolt Squeeze Strippers.
1—#610 Johnston & Jennings Air Jolt Rollover Draw Portable 24 x 30 table.
1—Tabor 36 x 50 table Air Jolt Rollover Draw, 3000# capacity.

BLOWERS FOR CUPOLAS AND FURNACES
1—Connersville Rotary Blower, 3500 CFM.
2—15 HP Spencer-Turbine 2250 CFM at 16 oz.
2—#7½ Roots rotary blowers—27 x 81—14000 CFM.
1—Connersville rotary blower 22 x 66 45 cu. ft. per revolution 9000 CFM.
Maxon-Premix Blowers for Gas ¼ to 1 HP.
2—5 HP 20-oz. Spencer Turbine Blowers.
2—2 HP 20-oz. Spencer Turbine Blowers.

METAL MELTING EQUIPMENT
1—1000# open flame brass melting furnace, gas fired.
1—MNP Fisher Tilting Al. Furnace 600# cap. gas fired.
1—550# Reda Furnace, nonferrous or iron—oil or gas.
1—Hausfeld Stationary Brass, oil or gas burner, 200# cap.
1—Hausfeld Tilting crucible, gas, 250# Al. Cap.
1—Hausfeld 2000# aluminum capacity furnace, barrel type, open flame, oil fired.
New 32" to 41" dia. shell cupolas made to order.
New 1000 lb. aluminum cap. tilting crucible furnaces to specifications.

MISCELLANEOUS
1—Pangborn Rotoblast, 14' dia. table with five 5' tables complete.
1—Pangborn 1 to 4 nozzle air blast generator, complete.
1—American Dust Tube Collector, 30 HP blower, 12000 CFM.
1—Sullivan, 2 stage compressor, 14-8¾ x 10, 75 HP.
500 ft. of 10" Roller Conveyor. Rolls 2½", centers 4".
1—Ruemelin cabinet style sand blast room, 7' x 7' x 5' with pres. generator.
1—15 HP Gardner Denver air cooled compressor unit.
1—Stoney crane type shakeout.
1—NC-4 Royer sand separator.
1—#1 Demmler core blower.
1—#16 Roto-clone unit complete.
1—McLeod Small Sand Blast Barrel 24 x 24.
1—McLeod Sand Blast Barrel 30 x 30.
1—30 x 48 tumbling mill.
1—36 x 48 tumbling mill.
Complete stock of rebuilt mill and dust exhaust blowers.

CLIFTON MACHINERY COMPANY
1023 W. SIXTH ST. — **CINCINNATI 3, OHIO**

FOR SALE

2—Twin Hopper "Handy Sandy's," less than two months usage.

REDA PUMP COMPANY
BARTLESVILLE, OKLAHOMA

FOR SALE

One Used Tabor Cut-of Machine #24139, 16" Wheel with 15 HP, 230 volts, 3 phase motor.

HARTFORD ELECTRIC STEEL CORPORATION
540 FLATBUSH AVENUE
HARTFORD 6, CONN.

FOR SALE

International Molding Machine 31" Type F Stationary jolt rollover 31" x 16", Serial 14751. Hydraulic flask rack, Serial 4814-481. Can be inspected at our plant.

THE EASTERN FOUNDRY COMPANY
BOYERTOWN, PENNSYLVANIA

SMALL GRAY IRON CASTINGS
FOR SALE

Castings up to 300 lbs. Write or Phone: OREGON CASTINGS COMPANY, LITITZ, PENNSYLVANIA, PHONE: 6-2462.

CLASSIFIED ADVERTISING

For Sale

FOR SALE

1—American Slag Conveyor System ½ H.P.—220/440-60-3 Like New.
1—Simplicity "KA"—18" x 78" Shaker feeder. 1 H.P.—220/440-60-3, Vari Speed drive—Like New.
1—Penn Bucket 20 cu. ft.—Like New.
1—Blystone 2A (3 cu. ft.) mixer 1 H.P. 220-60-3.
1—American Continuous Wheelabrator—15" with spare parts 220-60-3—Exc. Cond.
1—12" x 132" Flat apron conveyor 220/60/3.
1—Whiting 2500# Mixing ladle—geared—28" x 60".
1—Modern 2500# Mixing ladle—geared—29" x 54".
1—Nichols #11-32 Jolt-squeeze-strip Molding Machine.
1—Nichols #12 Heavy duty Jolt-squeeze-strip Molding Machine.
1—International Roll-Over Type G—24" x 10".
1—Model M Screenarator.
1—Osborn Plain Jolt #100.
1—Conveyor—2 sections Flat apron. 24" x 204" (both sections) with vari-drive 220-60-3.

WRITE OR CONTACT:
J. T. MOORE
WELLS MFG. CO.
7800 N. AUSTIN AVENUE
SKOKIE, ILLINOIS

FOR SALE
DETROIT ELECTRIC FURNACE

Type AA of 1,200 lb cold metal or 2,600 lb hot metal capacity, complete with mechanical and electrical equipment for melting and rocking, including oil filled transformer of 11,000 v. primary and 125 v. secondary. Presently crated but available for inspection on 48 hours notice. Ideal for high test cast irons, brasses or bronzes. Price: $9,500.00. Address: HOPE ELECTRICAL PRODUCTS CO., 338 WILSON AVENUE, NEWARK 5, N. J.

FOR SALE

15-ton P & H Overhead Crane with span of 49' 7½". In good condition. Operates on 220 Volt D.C. current. Will sell for $7,500.00. F.O.B. Cars Alpena, Michigan. Address: THUNDER BAY MFG. CORPORATION, ALPENA, MICHIGAN or 'phone Alpena 834.

FALL SPECIAL

36" x 42" AMERICAN WHEELABRATOR
Model 370

Complete with Motor Driven

Bucket Elevator

Speed Reducers 3/60/220-440 V Motors

Push Button Control

Excellent Condition

PRICE $2,500.00

EDWARD LAND, INC.

P.O. BOX 917

READING, PENNSYLVANIA

CALL COLLECT 6-3861—6-3862

FOR SALE

Two Ransohoff Wet Mills 60" x 72" with Sand Conveyor, sludge and settling tank, and gas flues to heat 1800 gal. water to 150° F. 26' x 56' floor space required.

GENERAL ELECTRIC CO.
ELMIRA, NEW YORK

FOR SALE

100 Sterling steel flasks, 26" x 14", 7" cope, 5" drag. Like new, with bottom boards. Low price. Address: BARCLAY FOUNDRY INC., 1555 S. BARCLAY STREET, MILWAUKEE 4, WISCONSIN.

FOR SALE

Six Pneumatic Jolt Squeezers in operating conditions at reasonable price. Address: KEEN FOUNDRY COMPANY, GRIFFITH, INDIANA.

BUY—TRADE—SELL

48 x 42 WEELABRATOR TUMBLAST	**$1,500.00**
27 x 36 Wheelabrator (Iron Belt)	2,700.00
#2 Wheelabrator Multi Table 8' diam.	3,500.00
Pangborn 6' Air Table	650.00
8' Pangborn Roto-table	2,500.00
Pangborn 1 cubic ft Air Barrell	350.00
Pangborn Vapor Blast good condition..	750.00

ALSO

Roto-Clone dust collectors, American Dust collectors various sizes, pressure tanks, hand cabinets, blowers, motors, etc., all types and sizes.
If you are interested in trading any of the above for your present equipment—Please call or write.

DIAMOND SAND BLAST INC.
5654 WEST JEFFERSON AVE.
DETROIT 9, MICHIGAN
PHONE VINEWOOD 3-6750

FOR SALE

1—Tinius Olsen 100,000# Universal Compression Testing Machine
1—Magnaflux Demagnetizing Unit
Simpson Sand Mixers 18" dia. Laboratory #0, #1, #1½, #2, #3
Miscellaneous: Screens, Pulverizers, Grinders, Conveyors—all types. Tyler Rotap Screens, etc.

OUR 37TH YEAR
CONSOLIDATED PRODUCTS CO., INC.
66 BLOOMFIELD STREET
HOBOKEN, NEW JERSEY
HO 3-4425 **N.Y. TEL. BA 7-0600**

We have a very large stock of good used foundry equipment. Your inquiry is appreciated.

FOUNDRY EQUIPMENT

SPECIAL BARGAINS

1—Pigmold Conveyor, 64' sprocket centers, Link-Belt, complete with drive and controls, 220/440/3/60.

1—3-ton — 3-motor Bedford Bridge Crane, 49' span, double built-up steel bridge with catwalk man cab, drum controls, roller collectors, 30 H.P. hoist motor, 10 H.P. travel motor, 3 H.P. Trolley motor, 220/440/3/60.

1—150 H.P. 875 CFM Ingersoll-Rand two-stage air compressor 220V, 3 ph. 60 cy., with air receiving tank, complete, can be demonstrated.

1—Lindberg Heat Treating Furnace 48"x60", 1400°, 90 KW, 230V., with 5 H.P. Blower, complete, like new.

1—Link-Belt Roller Type Power Mold Conveyor, 27'0"x70'6" centers, 35 cars 38"x72", to operate in a rectangular path at speed of approximately 45 ft. per minute, complete with structural steel supporting frame work, necessary take-ups, idler corners and driving mechanism, with speed reducer, motor and controls.

1—6000 lbs. Heroult-Lectromelt Electric Furnace, 3000 KVA, 132-00 Primary volts, 239-85 Secondary volts, Delta Y, with taps, 3 ph. 60 cy., all controls.

WE BUY AND SELL ONE PIECE OF EQUIPMENT OR COMPLETE FOUNDRIES

OUR GUARANTEE:
IF YOU ARE NOT SATISFIED WITH OUR EQUIPMENT, YOU MAY RETURN IT FOR A FULL REFUND.

EUCLID FOUNDRY & MACHINE EQUIPMENT COMPANY

14919 SARANAC ROAD **TELEPHONE: GLENVILLE 1-1222** **CLEVELAND 10, OHIO**

FOR SALE

MOLDING MACHINES

3—**SPO** No. 506 Jolt Rock-Over Pattern Draw Machines, 24" x 25" table, 10" draw, 600 lbs cap Portable or Stationary.
2—**SPO** No. 507 Jolt Rock-Over Pattern Draw 32" x 40" table, variable draw 10" to 20", 1500 lbs cap. 1948 models.
1—**SPO** No. 508 Jolt Rock-Over Pattern Draw Machine, 28" x 30" table, draw 9" cap. 1200 lbs. Jolt cap.
1—**SPO** No. 413-D Jolt Squeeze Power Rock-Over Pattern Draw 24" x 25" table, 10" draw, 600 lb cap. max. flask 26" x 36".
1—**SPO** No. 213-D Jolt Squeeze Strip Machine table 19" x 28", 8" draw, 800 lbs.
7—**SPO** No. 110J Jolt Squeezers, Portable.
4—**SPO** No. 2146 Jolt Squeeze Strippers, table 23" x 31", draw 6", 1000 lbs jolt cap. NEW in 1953.
3—**OSBORN** No. 559 Portable Jolt Strippers 25" x 30" table, 1200 lbs jolt.
2—**OSBORN** No. 601 Jolt Rollover Pattern Draw, 600 lbs cap. overall flask 30".
6—**OSBORN** No. 275 J, Jolt Squeezers.
2—**OSBORN** No. 142 Jolt Rollover Foot Draw 14½" x 24" table, 8" draw, 350#.
1—**OSBORN** No. 710J Jolt Squeeze Pin Lift, 16" x 25" table, 6" draw, 10" squeeze cyl.
1—**OSBORN** No. 712PJ Jolt Squeeze Pin Lift, 18" x 28" table, 6" draw, 12" squeeze cyl.
2—**HERMAN** 40" x 60"—13" Diam. Cyl. Heavy Duty Bumper Plain Jolt Machine.
1—**JOHNSTON & JENNINGS** No. 918-B Jolt Rollover Pattern Draw, 44" x 54" table, 18" draw 3000 lbs capacity.
2—**JOHNSTON & JENNINGS** No. 815-B Jolt Rollover Pattern Draw, 30" x 40" table, 15" draw, 1500 lbs cap. air operated head.
1—**TABOR** 22" Shockless Jar, Rollover & Pattern Draw, 22" x 42" table, 10" draw, 600 lbs cap. portable.
2—**TABOR** 30" Shockless Jar Rollover & Pattern Draw, 30" x 40" table, 12" draw, 1000 lbs. cap. Portable or Stationary.
2—**INTERNATIONAL** RES Jolt Squeeze Rollover Draw Size 15" x 8" draw, flask cap. 24" x 42" O.D.
1—**INTERNATIONAL** PKL Jolt Squeeze Air Pin Lift 18" x 24" table, 5½" draw, 12" squeeze cyl.
2—**INTERNATIONAL** G Jolt Rollover Foot Draw 18" x 56" table, 8" draw, (other 20" x 8").
1—**DAVENPORT** #2SSA Jolt Rollover & Pattern Draw 30" x 40" table, 12" draw, 1500 lbs cap. Serial #1191.
1—**MILWAUKEE** #1030 Jolt Pin Lift, 28" x 34" table, 12" draw, 1000 lbs cap.
3—**MILWAUKEE** No. 124-6 Jolt Squeeze, 17" x 26" table, 12" cylinder. Portable.

SAND PREPARATORS

8—**BEARDSLEY & PIPER** Models "S"-"M"-"L" Screenerators, portable units.
1—**BEARDSLEY & PIPER** #70 Portable Sand Preparators with magnetic separator, 90 cu. ft. hopper, gyrating screen, aerator, 1946 unit, ser. #SC-73.
1—**BEARDSLEY & PIPER** No. 40 Sand Preparator with magnetic separator, aerator, shaker screen etc. 40 ton capacity
1—**AMERICAN** Sand Cutter Model AM, size 69/45—serial #176—motors enclosed.
1—**AMERICAN** Sand Cutter Model BD, size 75/60—serial #722—motors enclosed.
1—**ROYER** Model NC-4 Portable Sand Conditioner, 12 to 15 tons per hour cap.
2—**ROYER** Model C-2 Portable Sand Conditioners, 25 to 30 tons per hour cap.

SHAKEOUTS

1—**ROYER** Shakeout & Sand Conditioning Unit, Serial No. ST-47.
1—**SIMPLICITY** 4' x 6' Model B Serial No. 46-SOB-145, 5000 lbs cap.
1—**SIMPLICITY** 4' x 8' Model BG, Serial No. 48-SOBG-185, 5000 lbs cap.
1—**SIMPLICITY** 2' x 3' Gyrating Sand Screen—single deck—Model CA—Motor.

CORE BLOWERS

3—**OSBORN** No.'s 91 & 92, with air clamps.
2—**REDFORD** No. 1, Cartridge Bench Type.
1—**DEMMLER** No. 1-E with Air Clamps.
1—**DEMMLER** No. 2 with Air Clamps.
1—**DEMMLER** No. 3K with air clamps, cores to 25 lbs cap. 1953 unit.
1—**CHAMPION** No. CB-400, weight of core to 300 lbs, draw 6½".

AIR & ELECTRIC HOISTS

4—**INGERSOLL-RAND** Size C, 2000 lbs.
7—**INGERSOLL-RAND** Size D, 4000 lbs.
1—**INGERSOLL-RAND** Size DR, 2000 lbs.
2—**INGERSOLL-RAND** Size E, 10,000 lbs.
2—**INGERSOLL-RAND** Size D-6, 6000 lbs.
1—**CHICAGO-PNEUMATIC** Model A, 1000#
1—**ELECTRO-LIFT** 3000 lbs capacity, low head room, cable type, 4 Hp motor.
4—**AMERICAN** Engineering Type A1, 2000 lbs cap. 220/3/60 cycle, for tramrail.
1—**SHAW BOX** 3 ton capacity "Load Lifter" 220/440/3/60 cycle, on 20' crane span.
1—**DETROIT** 5 ton cap. Model LHR, 440 volt Ser. #19317E 1953 unit.

SAND BLASTING EQUIPMENT

1—**AMERICAN WHEELABRATOR** 27" x 36" Tumblast w/skip hoist, shot return electrical etc. Ser. #A63757.
2—**AMERICAN WHEELABRATOR** 66" Diameter Swing Tables, w/shot return, dust collector, electrical etc. Ser. #82610, 1952 unit.
1—**PANGBORN** No. GK-2 Roto-Blast Barrel w/bucket loader etc. 7 cubic feet cap., drum size 30" x 38", airless type, 1943
2—**PANGBORN** EP-5 Shot Blast Cabinet 5' x 4' x 7' shot return, pressure tank.
1—**PANGBORN** Shot Blast Room, 10' x 10' x 12' walk-in type, with pressure tank, nozzles, hoses, elevator etc.
1—**PANGBORN** Roto-Blast Table 6' Diam. with 6-20" tables, Model LG.

TUMBLING BARRELS

1—**WHITING** 30" x 60" with 5 HP Gearhead motor & drive, 1952 unit.
5—**SLY** 36" x 60" with 5 HP Gearhead motor & drive—built-in magnetic brake.
2—**SLY** 42" x 72" Square 10 HP Gearhead motor & drive—built-in magnetic brake.
1—**SLY** 42" x 66", Type C, 10 HP gearhead motor drive—built-in magnetic brake.
1—**NEW HAVEN** Air Blast Barrel 42" x 48" with motor & drive etc. 1942 unit.

B & P SAND SLINGERS

1—**B & P** Tractor Type 13' w/4' impeller, 4" liner & cups, 19" head, w/spare head 22"-5" liner & cups—25 HP.
1—**B & P** Tractor Type 13' w/magnetic tower, 16" head, 4' ramming, 4" tip, 1946.
1—**B & P** Stationary Model DB, 6' arm, 4' impeller, 16" head, 4" tip with 5 ton plate feeder 10' x 7' chain drive & motor.

CUT-OFF SAWS & MACHINES

1—**TABOR** Type C10AF, cut-off saw, with 10 HP motor, serial No. 24626.
2—**TESSEMER** Model H, Sprue Cutter ¾" cap. brass, with 3 HP motor.
2—**CLIMAX** #2A Wire Straighteners, 4 Sizes 1/16" to ¼" with 1 HP V-belt.

CORE OVENS

2—**DESPATCH** Drawer Type, rail supports, controls etc. 59" deep, 9" high, 1944
3—**GEHNRICH** Single compartment recirculating gas fired, with all controls etc. 6' W x 11' L x 7' H walk-in type.

GRINDING EQUIPMENT

2—**FOX** No. 5 High Speed Stand Grinders, wheel size 24" x 3" w/10 HP motor.
1—**FOX** No. 7 High Speed Stand Grinder, wheel size 30" x 3", w/15 HP motor.
2—**HAMMOND** WR-1 Double End Snagging 7½ HP—wheel size 20" x 3" x 10"
1—**HAMMOND** WR-1 Double End Snagging 10 HP—wheel size 24" x 3" x 10".
1—**STANDARD** #30 Double End Multi-Speed Model 101—10 HP—wheel 24" x 3".
1—**U.S.** Double End Snag, Model 65, 20 HP-4 speed unit, wheel 24" x 3".
1—**MARSCHKE** Swing Frame, 3 HP-220/440.
3—**MARSCHKE** Swing Frame 15 HP 2 speed unit, wheel size 24" x 3"" x 12".
3—**MARSCHKE** Swing Frame 20 HP—3 speed units, wheel size 24" x 3" x 12".
1—**QUEEN CITY** Model 100 Double End Disc, 10 HP motor, wheel 20" x 2" x 2".
1—**U. S.** Electric Swing Frame, 15 HP, 2 speed unit, wheel size 24" x 3" x 12".

CONVEYORS—ROLLER-APRON-BELT

1000'—**MATHEWS** Gravity Roller, 10" wide 2½" roller dia. 4" centers.
700'—Gravity Roller—24" wide—2¾" diam. 4" centers, 4" channel, above rail.
1—**FARQUHAR** 18" x 35' Model 343, portable trough with 5 HP motor and elect.
1—**FARQUHAR** 18" x 19' Model 341 Undercar unloader, rubber belt, 5 HP motor.
1—**LINK-BELT** Steel Apron 18" x 24'.
125'—**LOUDEN** Monorail, complete with four 20' bridges and all accessories.
300'—**STANDARD** Gravity Roller 24" wide, 3½" diam. on 6" centers, 6" channel.
150'—**STANDARD** Gravity Roller 12" wide, 3½" dia. on 4" centers, 6" channel.

ELECTRIC FURNACES

3—**TROIT** Type AA, Rocking, 1500 to 2000 lbs cold charge, w/400 KVA transformers 4650 primary volts, single phase.
2—**DETROIT** Type AA, Rocking, 750 to 1000 lbs cold charge, w/250 KVA transformers. 4650 primary volts, single phase.
1—**PITTSBURGH-MOORE** Electro-Melt Furnace Model CQ, 4000 lbs capacity, less transformer & switch gear, 1939 unit.

SAND MULLERS

2—**SIMPSON** No. O, style B & C, 3' pan diam. 175 lbs batch, 5 HP V-belt drive.
1—**SIMPSON** No. 1 style B, single wheel type, open gear, 4' pan diam. 400 lb. batch size, with 5 HP motor and reducer.
2—**SIMPSON** No. 1 H, style K, Unit Drive type, 4' pan diam. 500 lbs batch, 2 muller wheels, w/ 5 HP Master unit drive.
1—**SIMPSON** No. 1½ style UD, unit drive type, 4' 6" pan diam. 700 lbs batch size, with 7½ HP Master Unit Drive.
1—**SIMPSON** No. 2, style UD, unit drive type, 6' pan diam. 1500 lbs batch size, with skip hoist loader and all electrical.
1—**SIMPSON** No. 2, Open Gear Type, with motor & drive wheel.
5—**SIMPSON** No. 3, Style C, Separate Drive 8' pan diam. 3000 lbs batch, 40 HP motor & Falk Reducers, serial No.'s in 58,000's, 1946 units. Gear enclosed.
1—**BEARDSLEY & PIPER** No. 60 Speed Muller, Model G, 10 cubic ft. batch size, with 50 HP motor and all electrical.
1—**BEARDSLEY & PIPER** No. 30 Speed Muller 3 cubic ft. batch size, with motor & electrical, serial No. 30-2.
2—**BEARDSLEY & PIPER** #3½ Mulbaro's portable, 3½ cubic ft. batch size.
1—**BEARDSLEY & PIPER** No. 50 Speed Muller, 7½ cubic feet batch size, w/skip hoist loader, 50 HP motor, Ser. #50-12.
1—**BEARDSLEY & PIPER** No. 70 Speed Muller, 15 cubic feet batch size, w/air cooling etc. 100 HP motor, 1946 unit.
1—**PORBECK** Model 3½ Core Sand Mixer, on pneumatic tires, w/1½ HP motor etc.

GAS & OIL FIRED FURNACES

3—**LINDBERG-FISHER** Model MNP, size 2400, gas or oil fired, w/motors-blowers, NEW pots, electrical tilting mechanisms.
5—**LINDBERG-FISHER** #400 Crucible, Type BBI, hand tilting, gas or oil fired, with motors-blowers, 1950 units.
1—**STROMAN** #600, Model U Tilting Reverberatory, gas or oil fired, w/motor-blower, 1949 unit.
2—**STANDARD** #30-#150 Crucible, Stationary gas or oil fired, w/motor-blower.

CUPOLA & FURNACE BLOWERS

1—**GE** Centrifugal Type FS3670-9400 Serial #27006, w/motor 100 HP, 3600 RPM.
1—**BUFFALO FORGE** No. 7-E, 25 HP-32 oz. 1600 CFM, 28" wheel.
9—Furnace Blowers 1-2-3-5-7½ HP-16 oz.

LADLES & POURING DEVICES

10—**WHITING** Riveted Crane Ladles, taper side with V-bail (E-Z Pour) enclosed gearings nose pouring, ½-1-2-3-4-5 ton.
6—**MODERN** 1500# Cylindrical Geared, with crane bails & floor stands, NEW covers, 30" dia x 29" length.
3—**MODERN** Mixing Ladles, on trunnions, geared, covered & lined, (2-40" x 60") 1-36" x 36", with preheaters.
6—**INDUSTRIAL**, Lip pour, 24" diam, x 24" H, 1600 lbs cap. Enclosed Timken gear.
12—**WHITING** Models 1000 & 2000 Pouring Device w/500# ladles, hand tilt devices.
6—**MODERN** Models F-FA-FA-9 & F-9 Pouring Devices with 500 Lb. covered ladles, trolley, & hand Tilt devices.

BUCKET ELEVATOR

1—**JEFFREY** 50' centers of drive pulleys, 106' belting 13", with continuous type buckets, Jones Reducer, motor etc.

CUPOLA CHARGER

1—**WHITING** 3 Ton Tiger Monorail, type 2 motor wishbone charger, cab operated, with controls, 5 buckets etc. 80' tram beam track & conductor. Buckets 48" x 52" w/super structure, 1953 unit.

HOUGH PAYLOADERS

1—Model HA, 12 cubic feet bucket, hydraulically controlled, on pneumatic tires, NEW 1953, serial #25908.
1—Model HA, 10 cubic feet bucket, hydraulically controlled, on pneumatic tires, REBUILT 3 months ago, serial #14783.

MOLD CONVEYOR

1—**PALMER** "B" w/no. HD-12 speed reducer & Reeves variable drive 4-1 ratio, 200' straight track, 7-3' sections 90° curves 1-6' section; 2-1' section 30° curves, car size 18" x 42", 80 cars, 1948

AAA MACHINERY & EQUIPMENT CO.

15539 SARANAC ROAD — *Members of American Foundrymen's Society* — CLEVELAND 10, OHIO

Phone: Liberty 1-6545

Electric Melting Furnaces

LECTROMELT 1 Ton, Side Charge. 800 KW transformer 12000 Volt primary. Late type unit. In place Chicago, complete.

LECTROMELT 500# Type T Side Charge. 300-375 KVA Transformer GE Circuit breaker. Moore controls 2300 volt primary current. Late type, now in our warehouse Chicago.

2—Swindell 6 ton 9′ dia. duplex furnaces, 1500 KVA —11000 V primary, G.E. transformers. Like New. May be seen in place.

1—Swindell Type Electric Furnace, 9′ dia. shell, complete.

1—2500 KVA Westinghouse Furnace transformer, 13,800 V Primary.

1—2500 KVA Westinghouse Furnace transformer, 11,000 V Primary.

1—DETROIT ELECTRIC, 1500# capacity, 13,200 primary voltage. Kuhlman transformers. Complete with controls.

DETROIT ELECTRIC 350#, Type LFA with Kuhlman transformers and oil circuit breaker. 13,200 primary voltage.

DETROIT ELECTRIC with 350# and 1000# tapered shells, 2300V Kuhlman Transformer. Complete with panelboard and bus bars.

1—Ajax 300# Induction Furnace.

ACME EQUIPMENT CO., INC., 126 South Clinton Street, Chicago 6, Illinois, Phone: Andover 3-3430.

FOR SALE

AIR COMPRESSORS

Ingersoll Rand Type 10—14 x 9 x 12, 2 stage, 75 HP, 3/60/220/1200 rpm synchronous motor, 350 CFM at 100#.
5 x 5 Ingersoll Rand 10 HP motor.

BLOWERS

Spencer Turbo Blower, 2250 CFM at 16 oz. 15 HP 3/60/220 totally enclosed motor. New 1947.
Ingersoll Rand Motor Blower Type FS. Single Stage 4000 CFM @ 3.75 PSI. 100 HP, 220 V. G.E. Induction Motor.
Buffalo 7E Direct Connected Blower, 50 HP Westinghouse motor, 3/60/220-440 V, 3535 rpm, 28" wheel, 3500-4000 CFM at 32 oz. Flanged outlet.
Spencer Turbo Blower, New 1949. 3500 cfm, 28 oz. with 40 HP 220-440 motor and Foxboro controls.
General Electric 7500 CFM, 20 oz., 89.6 Max HP, 220 V motor. Airway controls.

CONVERTER

100 KW Rotary Westinghouse 220 V 60 cycle primary 250 V DC, complete with controller and panel.

CORE BLOWERS

International SB 13.
Federal Sandblo CB40B, like new.
Demmler #50.

CRANES

5 Ton P & H Overhead Elec. Traveling Crane, 30′6" span, 15′ lift (can be increased) 3 motor, 220 V A.C. New 1946.
10 Ton Northern Overhead Elec. Traveling Crane, double girder, fish belly, 3 motors, 230 V D.C., 54′7½" wide C to C of wheels can be cut down to fit smaller size.

CRUSHERS—PULVERIZERS

1—Stedman 15" x 12" Type A. With 10 HP 220-440 V motor.

GRINDERS, DISC

Besley 208 Double End 26" x 2¾" wheel with 2 compound tables, V belt drive, 15 HP, 220-440 totally enclosed motor, magnetic starter controls.
2—U. S. Model 80 Double End 2-18" dia. wheels, 7½ HP motor, 2 swinging tables 8" x 14"—1 with hand lever feed.

GRINDERS, SNAGGING

McCabe 2" x 24" wheels, 48" between wheels, 3/60/440 V.
1—Hammond type 20 WR2—3" x 24" wheel, double end grinder, single speed, 20 HP Louis Allis Squirrel Cage, 220-440 V—1760 rpm motor.
1—U. S. DE, Model 65, 3" x 24" wheels, variable speed, 20 HP motor.
Hisey Wolf adjustable speed 15 HP 30" x 3" wheels, 220/440 V motor.

GRINDERS, SWING

2—Fox 10 HP 3/60/220-440 V, Swing Frame.
U. S. 15 HP, 3/60/440 V Swing Frame, 2 speed.
Fox 15 HP Swing Frame, 2 speed.
Marschke 20 HP, 2 speed.

HOISTS

1000# Cleveland 220/440 V.
1000# Detroit 220/440 V.
5—1000# P & H Hevi Duty with trolley.
2—2000# P & H Hevi Duty with trolley.
11—4000# P & H Hevi Duty with trolley.
2—4000# P & H Hevi Duty with trolley and powered drive unit for moving hot metal.

LADLES

1 Ton Enclosed Gear Crane Ladle truck type 4 wheel car for 18" gage track, Whiting Junior.

MOLDING MACHINES

2—Champion Pin Pushoffs, 38" x 40"—12" draw.
1—Johnston & Jennings 1015 Jolt Pin Lift, 30" x 38" table.
1—Champion Hand ram, hand clamp, hand rollovers 26" x 14" table.
1—Champion Hand Ram, Hand rollover, Hand draw core machines, 15 x 15 bed.
3—Davenport Portable Jolt Rollover Pattern Draw 20" x 24" tables, open end, 8" draw.
1—International Type G 24 x 10 Jolt Rollover, foot draw, 22 x 30 table, 10" draw.
1—Herman Molding Machine Jolt Rollover Pattern Draw, 20 x 30.
1—Herman Molding Machine Jolt Rollover Pattern Draw, 20 x 36.
1—International Type G 30 x 12 Jolt Rollover Foot Draw, 28" x 36" table, 12" draw.
1—International Type G 30" x 30" table, 9" draw, Portable.
2—International Type G 18" x 56" table, 8" draw, Portable.
1—International Type F Jolt Rollover 27 x 12, 12" draw, 35" x 26" table.
1—International Jolt Rollover Pattern 10" Draw, 22" x 30" plate, 6" jolt cylinder.
1—International Plain Jolt Molding Machine 48" x 60" table, no pit required.
1—Herman Jolt Rollover Pattern draw, 40" x 84" table, slotted nickel alloy table over regular table to accommodate various sized flasks, air clamp, new 1946. Used very little.
1—Herman 20" x 30" rollover pattern draw, 750# series. Air clamp.
2—Herman 20" x 24" Jolt Rollover Pattern Draw, 750# series. Air clamp.
1—Herman 4000# Series High Speed Rollover 30" x 60" with 32" x 48" bumper, 13" cylinder pattern device.
2—Milwaukee Arm Type Jolt Squeeze Strippers, 1500# capacity, Model 163-50 Serial 13104-5, 15" x 24" table, 16" x open end, pattern size. Late type.
1—Osborn 76J Portable Jolt Squeeze Molding Machine 12" cylinder.
2—Osborn 405 Jolt Rollover 40" x 70", 2000# capacity, 20" x 60" jolt table and 4 wheel receiving car.
1—Tabor 1000# Rollover, 30" x 60" table.
4—Spo 214 Jolt Squeeze Pin Lifts.

MULLERS AND MIXERS

Simpson #2 Motor on base.
Simpson #3 Motor on base.
Simpson #3 Type H open gear type.
Simpson #3 Open Gear Type. $1000.00.
American Model M Sand Cutter, 70" blades.
Royer NDP 47 14" Belt, 4 rubber tires.
B & P #60 with skip loader.
B & P Speedmuller 80 w/cooling blower.

PREPARATOR

B & P #70 Preparator. Only used 3 months.

ROTOBLAST

Pangborn, table with 3-8" rotating work tables, 3 position loading, cleaning and touch-up designed for work similar in size to aircraft cylinders. Like New condition.

SHAKEOUTS

2—4′ x 6′ Simplicity.
1—4 x 6 Simplicity, 15,000# capacity.

SPEED REDUCERS

We have a large stock of speed reducers and geared head motors. Write us your needs.

TUMBLING BARRELS

2—Sly 42" x 48" dia. barrels, master geared head motor drives.

WHEELABRATORS

1—American Wheelabrator 48" x 48" with loader, 220/440 V motors.
1—American Wheelabrator 36" x 42" with loader, 220/440 V motors.

WIRE STRAIGHTENERS

2—Climax 1 HP motor.

ACME EQUIPMENT CO., INC.

WE WILL BUY FOR CASH A SINGLE PIECE OF EQUIPMENT OR YOUR ENTIRE FOUNDRY

126 South Clinton Street Phone: Andover 3-3430 Chicago 6, Illinois

PUBLIC AUCTION SALE

Complete Gray Iron Foundry and Machine Shop—

MACHINE AND TRANSMISSION DIVISION
THE MEDART COMPANY
3500 DeKalb Avenue • St. Louis, Missouri

TUESDAY & WEDNESDAY, NOVEMBER 9th & 10th, 1954, 10:00 A.M. (CST)

AIR COMPRESSORS:

2—Sullivan 2-stage Y type Model WN-112-E 15½" x 9¼" x 7" 125# 150 H.P. Synchronous motors 3/60/440—3 KW Exciter direct connected, Intercooler, Aftercooler, Silencer, Mechanical oiler and Receiver.

CLEANING DEPARTMENT:

48" x 42" American Tumblast Model 450 Bucket loader 220/440 motors.

Sly Blast Room 12' x 8' x 8' high elevator and screw conveyor. 18" x 3" U.S. D.E. Snag Grinder 7½ H.P. 220/440 volt motor. 14 x 3 U.S. D.E. Snag Grinder 5 H.P. 3/60/220 motor.

CORE ROOM:

#1½ Model S Simpson Muller, Falk reduction drive, 440 volt motor.

Demler #3 Core Blower.

Demler #50 Core Blower.

2—American Stock Core Machines, Style C.

MOLDING DEPARTMENT:

B & P Motive Jr. Sand Slinger; Lowering and raising block; Serial J170 2-speed head 13/20 h.p. 440 volt A.C.

B & P Stationary Slinger 30 h.p. 3/60/440 motor, 5 ton plate feeder.

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International Type F 37 x 16" draw, 38" x 77" table.

2—20" Int'l Type RJ Jolt Rollovers 18" draw. International Plain Jolt 76" x 76" table, 20" cylinder.

MOLDING DEPARTMENT (CONT.)

2—Int'l Plain Jolt 31" x 44" table, 6" cylinder. International LJS Jolt Squeezer 12" cylinder. International PJS Jolt Squeezer 9" cylinder.

2—Spo 113 Jolt Squeezer 13" cylinder.

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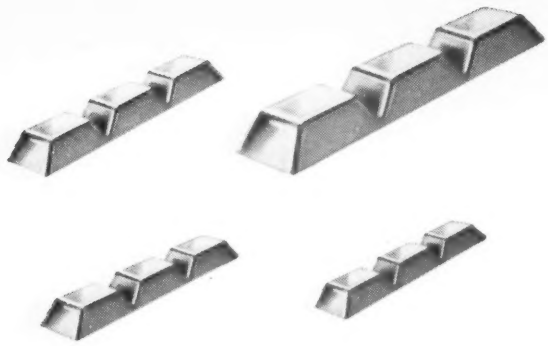

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PROVE IT TO YOURSELF!

Tuffy® SLINGS

FREE Tuffy Sling!
Any Test You Can Devise
Will Prove It's the Toughest
Sling You Can Buy!

The Best Way To Convince A Man of anything is to let him prove it to himself! That's why we are willing to send you a sample 3-Ft. Tuffy Sling, absolutely *free*. There's nothing to buy, no obligation of any kind!

"Torture Test" This Sling and see for yourself how its patented, machine-braided wire fabric construction enables it to stand up under conditions that would cause ordinary rope slings to fail.

Loop It, Knot It, Kink It, Jerk It! Put this Tuffy Sling to the most grueling tests you can think of! When you see how its extra flexibility lets it resist kinking, its ease of straightening out kinks without material damage, and its unparalleled stamina under stresses and strains of all kinds—then we know you'll be convinced that Tuffy is the *toughest* in the business!

Your Tuffy Distributor is Set Up For Speedy Service!

"Fast!" That's the word your Tuffy distributor is accustomed to hearing. He knows how important it is to get you the replacement slings and rope you want, *when* you want it. He's equipped to handle your hurry-up orders and there's a Union Wire depot or warehouse nearby to back him up. For "right now" delivery, call your *Tuffy* distributor!

union *Wire Rope* **corp.**

Specialists in High Carbon Wire, Wire Rope and Braided Wire Fabric

Tuffy® HOIST LINE

Matches Tuffy Slings in strength and wearability . . . stays on the job longer to reduce operating costs! Users consistently report Tuffy Hoist Line is the best they've ever used when it comes to flexibility and downright toughness!

No Complicated Specifications! Ordering is easy, because all you need to specify is the length, diameter and the name —*Tuffy* Hoist Line. Get full measure of hoisting service you pay for with Tuffy Hoist Line!

TEAR OFF AND MAIL COUPON *NOW!*

Union Wire Rope Corporation
2280 Manchester Ave., Kansas City 26, Mo.

At no cost or obligation to me, please rush the material I have checked:

- ☐ FREE 3-Ft. Tuffy Sling!
- ☐ FREE Sling Handbook and Rigger's Manual, Featuring 12 Tuffy Factory-Fitted Types!
- ☐ Name and Address of Tuffy Distributor Nearest Me!

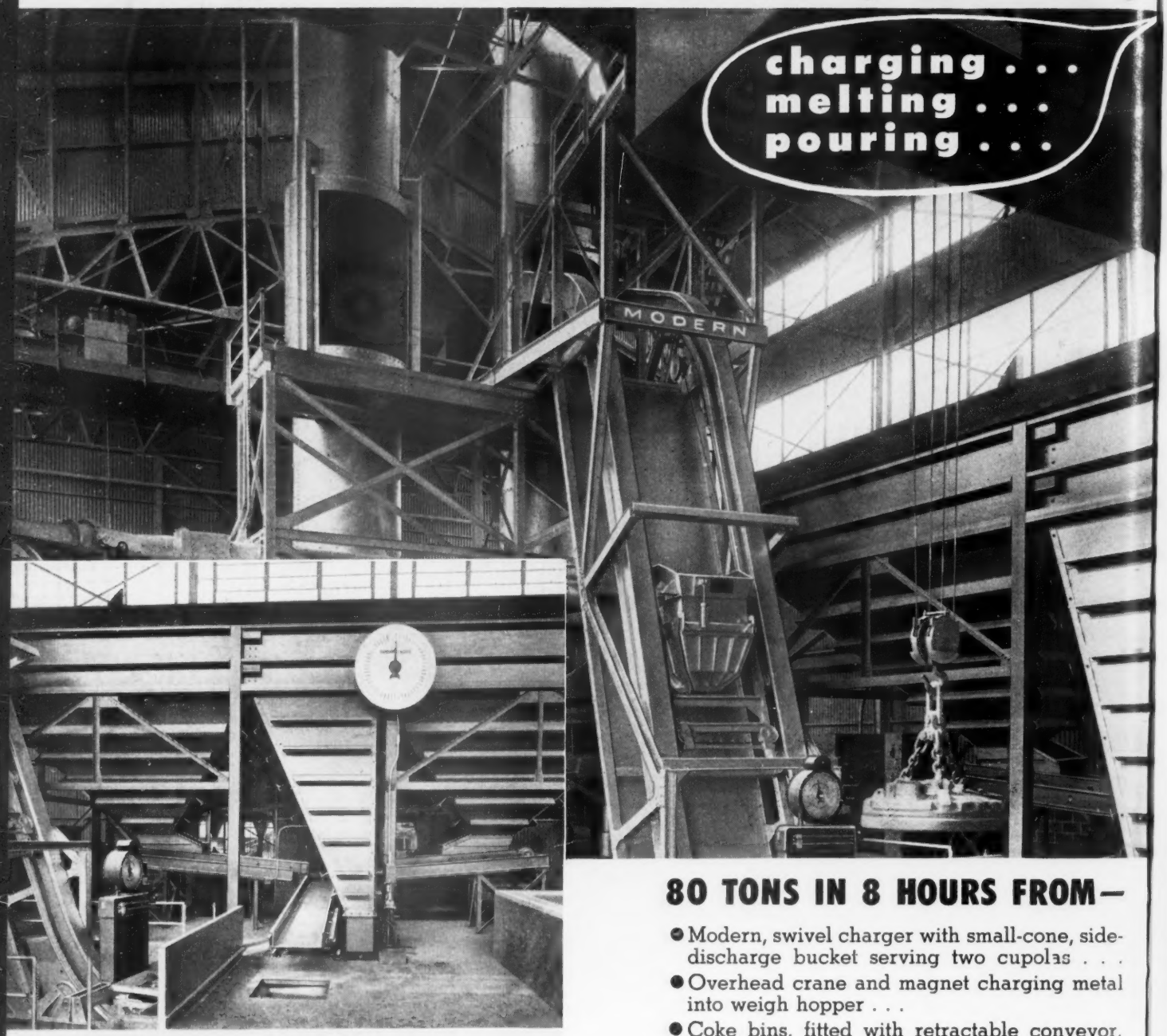
FIRM NAME _____

BY _____ TITLE _____

ADDRESS _____

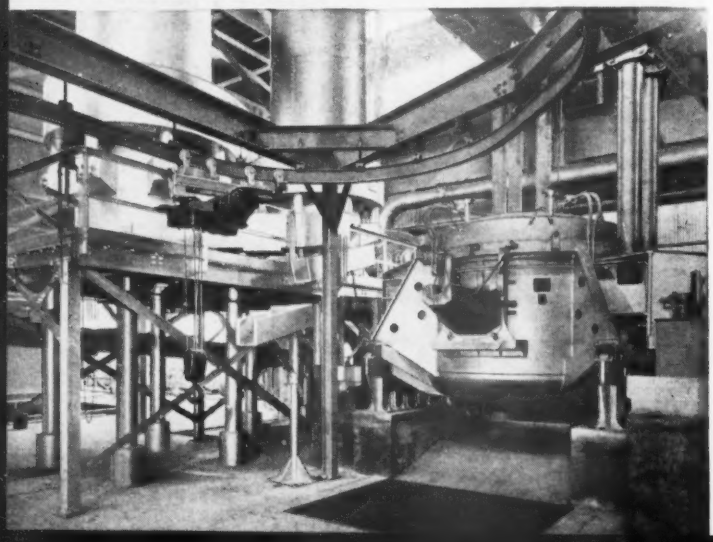
CITY _____ ZONE _____ STATE _____

Under One Roof and One Responsibility



Stone and two compartment coke bin with conveyors feeding coke to central, retractable conveyor. Large dial aids the crane operator in preparing accurate charges.

Front view of duplexing operation. Tilting, cupola spout directs metal to either the electric furnace or to a secondary, swiveling spout for filling the ladles. Cupolas are designed for future, hot blast installation.



80 TONS IN 8 HOURS FROM—

- Modern, swivel charger with small-cone, side-discharge bucket serving two cupolas . . .
- Overhead crane and magnet charging metal into weigh hopper . . .
- Coke bins, fitted with retractable conveyor, convey the coke to the weigh hopper . . .
- Two, 78", Modern cupolas with—water type spark arrestors, water slag removal, centrifugal blowers and automatic control equipment . . .
- From cupolas the metal flows through furnace to Modern distributing ladles and on to the pouring floors . . .

This installation—synchronized for high tonnage and low operating cost at Fairbanks, Morse & Company in Kansas City—proves the satisfaction of MODERN RESPONSIBILITY for consulting . . . engineering . . . manufacturing and erection . . .

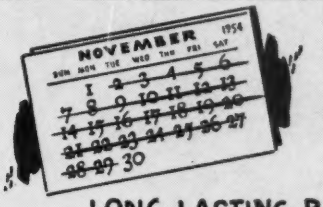
MODERN

MODERN EQUIPMENT COMPANY

DEPT. 11-54 Port Washington, Wisconsin

"Facing" Facts

FROM STEVENS FACING DEPARTMENT

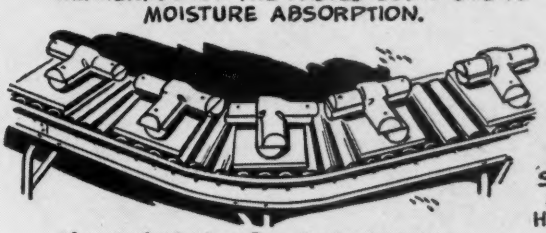


LONG LASTING BOND

STEVENS KORFAST PASTED CORES CAN BE HELD FOR WEEKS WITHOUT APPRECIABLE WEAKENING OF THE PASTED JOINT DUE TO MOISTURE ABSORPTION.

STRONGER THAN ANY OTHER CORE PASTE

MAKE THIS TEST. PASTE HOT CORES WITH STEVENS KORFAST—ALLOW TO STAND FOR 15 MINUTES. WITH ONLY 70% TRANSFER THE PASTED HALVES WILL HAVE HIGHER TENSILE STRENGTH THAN THE BONDED SAND. THE SEVEREST TEST, A HAMMER AND CHISEL, WILL SHOW THE SAND GIVING WAY BEFORE THE PASTED JOINT.



NO SHIFTING OR BLISTERING

WHEN APPLIED TO HOT CORES, STEVENS KORFAST WILL NOT BLISTER. FAST "GREEN GRAB" PREVENTS SHIFTING OF CORE HALVES.

READY MIXED SAVES TIME

READY MIXED LIQUID FASTICK SPEEDS UP PRODUCTION. TIME AND LABOR REQUIRED TO MIX DRY PASTES IS ELIMINATED.

QUICK DRYING

WITH STEVENS LIQUID FASTICK YOUR CORE ROOM WILL NOT BE FILLED UP WITH DRYING CORE ASSEMBLIES. AIR DRIED CORES CAN BE SET IN THE MOLDS IN LESS THAN THREE HOURS. LIQUID FASTICK SAVES OVEN SPACE.

NEW STEVENS CORE PASTES.... solve many core room problems

Developed by Stevens foundry research, two new core pastes, Korfast and Liquid Fastick, have quickly met with enthusiastic response from the foundry industry. A New York state foundry writes, "*Korfast is the best core paste we have ever used.*" Speaking of Liquid Fastick an Illinois foundry states, "*Since using Liquid Fastick our scrap losses have been reduced so greatly we could well afford to pay many times the actual cost per pound.*"

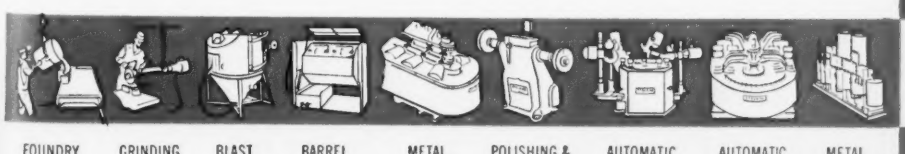
Some of the advantages you gain from using either of Stevens new core pastes are listed in the cartoon illustrations above. Both are fast drying with low gas evolution.

Liquid Fastick eliminates use of clamps on shell mold halves and is ideal for resin-bonded cores. Only a thin application is needed, high temperature will not reduce strength.

Call your Stevens Sales Representative today or write for Stevens Technical Bulletins F-105 and F-113 on Korfast and Liquid Fastick.

BRANCHES: BUFFALO • CLEVELAND • INDIANAPOLIS
NEW HAVEN • DAYTON

IN CANADA: FREDERIC B. STEVENS OF CANADA, LTD.
TORONTO • WINDSOR

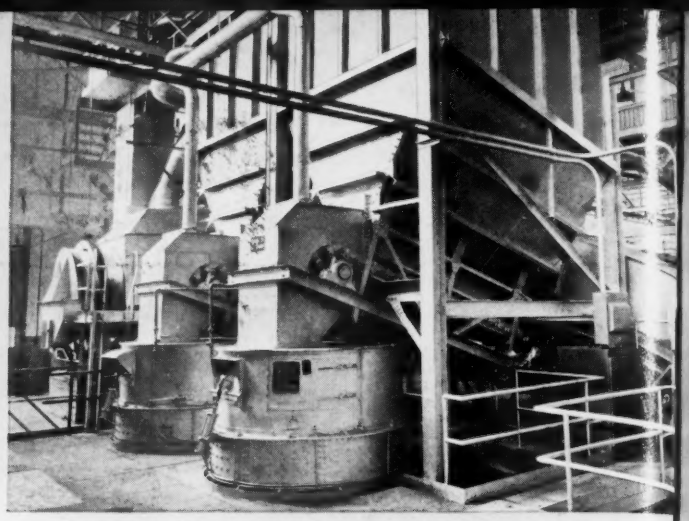


FOUNDRY FACINGS | GRINDING OPERATIONS | BLAST FINISHING | BARREL TUMBLING | METAL CLEANING | POLISHING & BUFFING | AUTOMATIC FINISHING | AUTOMATIC PLATING | METAL RECLAMATION

Metal Finishing equipment and supplies from castings or stampings to finished product

FREDERIC B.
STEVENS
INCORPORATED
EVERYTHING FOR A FOUNDRY
DETROIT 11, MICHIGAN

Sand Preparation Plant Showing Storage Bins, Weigh Hopper and Muller.



Compact Sand Preparation Plant in Large Mid-Western Gray Iron Foundry

Sand Preparation Systems

engineered for YOUR exact requirements

Bartlett-Snow systems assure unvarying uniformity of sand quality — more molds per day — better castings — less scrap — increased production — lower costs.

● Complete facilities include collection of shakeout and strike-off sand — cooling — screening — adequate storage — mixing — aeration and return to molders. Fixed responsibility assures highly efficient synchronized operation of the entire system as a unit. Rugged construction assures low maintenance and low operating costs. Many steel, malleable, gray iron and non-ferrous installations.

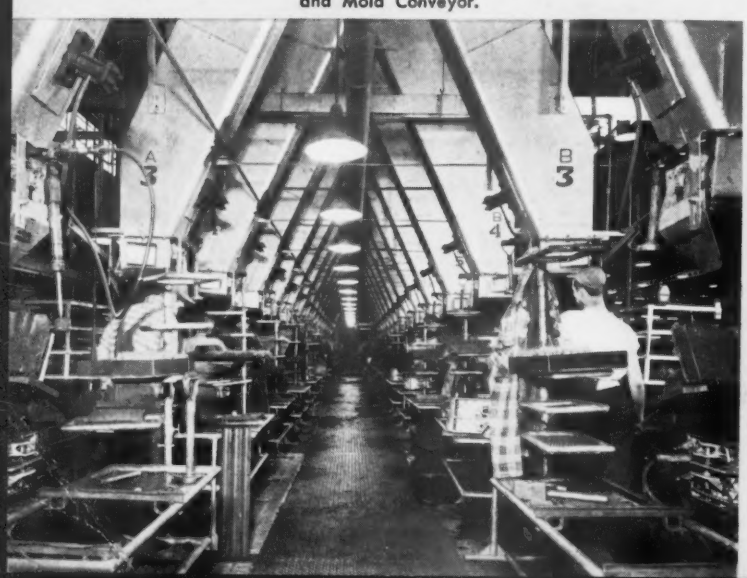
DESIGNERS ENGINEERS

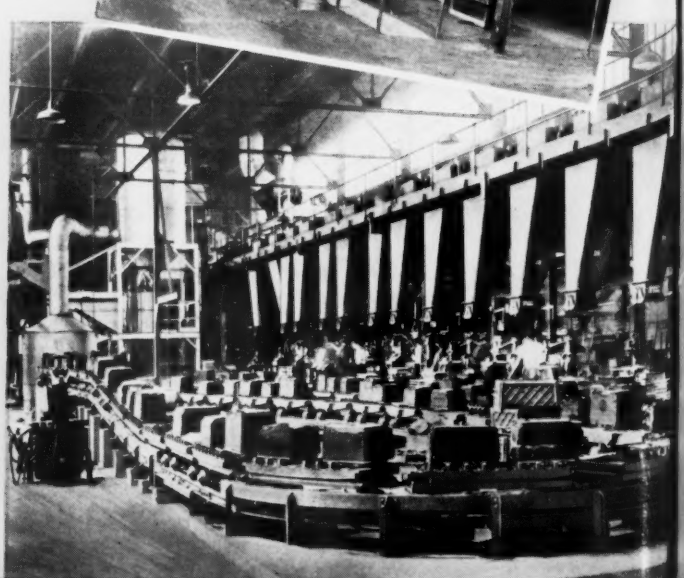
BARTLETT B-SNOW
CLEVELAND 5, OHIO

FABRICATORS ERECTORS

Foundrymen Who Know — Buy Bartlett Snow

Sand Preparation Plant
Showing Screen Mounted Above Storage Bins.





Below—Left: Overhead Return of Prepared Sand to Molders. Below—Right: General View of Large Jobbing Foundry Showing Sand Plant, Molders Hoppers and Mold Conveyor.